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THE REVIEW
OF
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New or uncommon plant diseases and pests in England and Wales.—*Plant Path.*, 4, 1, pp. 32–33, 2 pl. (between pp. 16 and 17), 1955.

JUNE V. IVES reports that ergot (*Claviceps purpurea*) was found in a 14-acre field of canary grass (*Phalaris canariensis*) at Great Chesterford, Essex, in the autumn of 1954. The weed grass, *Alopecurus myosuroides*, growing in the same field, was also affected. This is the first record of *C. purpurea* on *P. canariensis* in Britain.

D. L. G. DAVIES, MARY NOBLE, and THERESA NORMAN state that in mid-June, 1954, halo blight (*Pseudomonas coronafaciens*) occurred throughout an extensive collection of spring oat breeding material at the Welsh Plant Breeding Station, near Aberystwyth. Later, the disease was observed in Cambridge and at Cockle Park, Northumberland; slight infection was present in Northumberland and Cumberland. The disease has not been recorded before in England or Wales.

A. G. ROBERTSON briefly describes a flower scorch which in December, 1953, affected chrysanthemums growing in unheated Dutch lights at Tolpuddle, Dorset. Further specimens were received in 1953 from nurseries at Salisbury and at Frome, Somerset. Small rusty-brown spots or larger, rather oval, translucent lesions appear in the outer florets, which rapidly wither, the whole flower ultimately becoming brown and withered. *Botrytis* often masks the original infections, which bear the sporidia, measuring 10 to 18 by 7 to 13 μ, of a fungus resembling *Entyloma calendulae*. Preliminary inoculations reproduced the symptoms on Sweetheart chrysanthemums under conditions of high humidity and at a temperature of 55° to 60° F. In 1954, the disease was reported from at least six more nurseries in south-western England and from Sussex and Hertfordshire.

HARRIS (R. V.). **Plant pathology.**—*Rep. E. Malling Res. Sta., 1953*, pp. 37–42, 1954.

In this report [cf. *R.A.M.*, 33, p. 68] it is stated that a series of weekly inoculations of a resistant and a sensitive cherry variety through leaf scars induced naturally by earlier removal of the leaf lamina gave results suggesting that under natural conditions most infections by *Pseudomonas mors-prunorum* [loc. cit.] may occur through scars caused by occasional leaf fall in early autumn. In a parallel series where scars were exposed by forcible removal of the leaves, disease severity increased at all times of inoculation, from which it is concluded that the severity of the reaction following normal leaf scar infection tends to be limited by host changes occurring naturally during the general leaf fall period. With mixed inocula containing viable cells of the saprophytic bacterium commonly found on the leaf surface [33, p. 69] there was a considerable reduction in the disease rating, apparently due to the biological activity of the saprophyte in the vascular traces. In two

successive seasons an additional Bordeaux spray in mid-September on the Schrecken variety improved the degree of control obtained by the schedule usually recommended.

When trees of Cox's Orange Pippin and Worcester Pearmain apple and Williams' Bon Chrétien pear were injected at various times immediately before and during the incubation period of infection by *Venturia* [*inaequalis* and *V. pirina*: loc. cit.] with the aromatic fraction from tree extracts, or purified constituents thereof, separately and combined with certain amino-nitrogen compounds, the degree of infection varied greatly according to the injectant. Four Cox trees on M.IV injected with the aromatic fraction of a Cox extract one day after infection showed a high degree of scab inhibition but with a mixture of the aromatic fraction and urea there was no inhibitory effect. Similar results were obtained on the pathogens *in vitro*.

Of 12 hop seedlings submitted for testing by Professor Salmon, OZ97a showed moderately high tolerance of *Verticillium albo-atrum* [loc. cit.; 34, p. 398]. Early Prolific is the most efficient indicator for nettlehead virus tested so far [28, p. 309]. Symptoms were recognized 12 weeks after grafting but the maximum incubation period has yet to be determined.

Mutual antagonism was shown to exist between some strains of apple mosaic virus [33, p. 69], with the possibility of protection by mild strains. Furthermore, a severe strain may be unevenly distributed among the buds of a single bud-stick [34, p. 598]. Two plum viruses produce a mosaic-like symptom on apple. Extensive indexing of pear scion varieties revealed a wide distribution of infection by viruses causing four distinct symptom types on the quince indicators. In attempts to graft-transmit cherry viruses [33, p. 611] from artificially infected F 12/1 stocks to the indicator Napoleon, severe rasp leaf caused the failure of a high proportion of the grafts. Of about 29 plum varieties tested, 17 yielded virus-free trees. Symptoms resembling those of plum pox in Eastern Europe [34, p. 530] were observed on Early Laxton and Warwickshire Drooper plum trees inoculated in 1951 with suspected viruses collected from commercial orchards. Symptoms of bark split virus [33, p. 95] were frequently observed in commercial orchards and nurseries in the Evesham district, and indexing experiments suggested that more than one virus may be involved.

Cambridge 'X' virus of strawberry was shown to be indistinguishable from mild crinkle on the basis of aphid relationships; leaf necrosis in *F*[*ragaria*] *vesca* and Royal Sovereign is not necessarily a distinguishing criterion. Crown proliferation and severe dwarfing of *F. vesca* were the most reliable diagnostic features; a virus causing these symptoms alone was isolated by single-aphid transfer from a plant infected with both 'X' and mild crinkle. In further experiments on heat therapy Prentice's virus 4 [strawberry vein chlorosis virus: 32, p. 573] was inactivated as well as 1 [strawberry mottle virus] and 3 [crinkle: 32, p. 262]. Virus 2 (mild yellow edge) was inactivated in Royal Sovereign plants exposed to 98° F. for long periods.

A considerably modified version of the prototype orchard spraying machine provided by the Horticultural Engineering Department of the National Institute of Agricultural Engineering gave a satisfactory deposit of 100 per cent. lime-sulphur concentrate in small droplets on all but tall, dense trees, caused no damage, and, on apple, controlled *Venturia inaequalis* well in comparison with the standard high-volume lime-sulphur schedule [cf. 34, p. 600].

First Annual Report, 1953–4, Scottish Agricultural Research Institute.—28 pp., 1 pl., 1954. [Received 1955.]

In the section of this report (pp. 17–20) dealing with the work of the Department of Plant Pathology, Scottish Agricultural Research Institute, Dundee (by C. H. Cadman), studies on raspberry leaf-curl virus [*R.A.M.*, 32, p. 387] by the author,

J. Chambers, and A. G. Fisken are described. When infected raspberry leaves were ground with nicotine sulphate the extract, after dialysis, contained viruses that produced ring spot symptoms on tobacco, cucumber, petunia, and other solanaceous hosts. No symptoms were produced on these hosts by similarly treated extracts from symptomless carrier raspberries of certain aphid-borne viruses. Some 400 Norfolk Giant raspberry seedlings were inoculated with sap from a tobacco culture of raspberry leaf-curl; three to four weeks later six developed typical leaf-curl. This is the first time that any virus affecting raspberries has proved to be sap-transmissible.

These ring spot viruses were readily transmitted from infected tobacco and petunia to *Nicotiana rustica*, *N. glutinosa*, *Physalis* spp., *Tropaeolum*, and tomato. They produced local lesions on French bean [*Phaseolus vulgaris*], *Datura stramonium*, and *Hyoscyamus niger*, from all of which virus was transferred to petunia. None of the local lesion isolates gave protection against infection by tobacco ring spot, *Tropaeolum* ring spot, or tomato black ring viruses.

The leaf-curl ring spots also produced symptoms on common weeds, including chickweed [*Stellaria media*], groundsel [*Senecio vulgaris*], *Plantago major*, and *P. lanceolata*. Similar, though not identical, viruses were found in sugar beet, *S. vulgaris*, *Stellaria media*, coltsfoot [*Tussilago farfara*], ragwort [*Senecio jacobea*], and thistles [*Carduus*, *Cirsium*] near raspberry leaf curl outbreaks. It is presumed that weed hosts are the sources of leaf-curl infection.

According to J. Chambers the production of healthy raspberry stocks has been revolutionized by the finding that virus-infected plants can be freed from virus by growing them for periods of 16 to 21 days at temperatures of 35° to 38° C. [33, p. 435]. In this way virus-free plants of Norfolk Giant, Lloyd George, Malling Jewel, and Burnetholm Seedling were obtained, and are being propagated intensively. The latent virus present in Malling Promise [loc. cit.] withstood 21 days' exposure to 35°.

On p. 27 I. G. Montgomerie reports that three biotypes of *Phytophthora fragariae* [cf. 32, p. 388] have now been identified among ten isolates by means of differential varietal reactions, and work is being continued with 21 more isolates. A number of seedlings resulting from the 'selfing' of varieties of strawberry or species of *Fragaria* were tested for resistance to a biotype from Huxley. The method of inoculation (dipping the roots of seedlings at the 3 to 4 leaf stage in a zoospore suspension and planting in sterilized sand [cf. 32, p. 633]) produced symptoms of infection in susceptible seedlings six days after inoculation. Further testing is in progress.

Work by A. M. Sutherland, K. McConnell, and R. D. Reid (p. 28) demonstrated that the symptoms associated with the serious degeneration of Climax strawberry plants, progressing from transient yellows through a varied range of symptoms to acute streak [cf. 34, p. 655], are largely conditioned by the temperature that prevails during critical growing periods.

Bates (G. R.). **Diseases of plants. A Rhodesian mycological review.**—*Rhod. Fmr Yearb., 1953*, pp. 173–174, 1953.

This is a general account of the chief diseases of economic crops in Rhodesia, where their systematic study was begun only thirty years ago. The diseases mentioned, on tobacco, maize, potato, cabbage, and citrus, have all been noted from time to time in this *Review*.

Agricultural Research.—*Rep. Indian Coun. agric. Res., 1952–53*, pp. 2–45, 1954.

In the section of this report [cf. *R.A.M.*, 34, p. 81] dealing with plant virus diseases it is stated that purified *Datura* mosaic virus was electrophoretically homogeneous over a pH range of 5·5 to 7·6. *Impatiens balsamina*, *Tropaeolum majus*, and sunflower displayed symptoms when inoculated with papaw mosaic [loc. cit.] but the virus was not recovered; *Myzus persicae* was more efficient as a

vector than *Aphis gossypii* and the virus was non-persistent. *Cucurbita moschata* mosaic virus [loc. cit.] was inactivated at a dilution of 1 in 5,000 and after three days at laboratory temperature. A virus causing yellow vein mosaic of pumpkin at Poona in 1951 was transmitted by *Bemisia tabaci* but not by sap. Eggplant mosaic virus [loc. cit.] was inactivated at a dilution of 1 in 1,000 and after three days' storage; it was transmissible both by sap and *Myzus persicae*. Seven cotton varieties were infected by the small leaf disease by means of graft inoculations.

A number of wild grasses were found to be hosts of *Piricularia oryzae*; of these *Panicum repens* was the most widely distributed and is probably mainly responsible for the carry-over of infection in rice fields [cf. 34, p. 175]. Seed treatment of rice with mergamma, certosan, agrosan 4, and ceresan gave complete control of foot rot [*Gibberella fujikuroi*: 34, p. 542]. During a study of *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] on rice in West Bengal it was shown that leaves were most susceptible when the plants were two to three weeks old [cf. 33, p. 625] and that heavy infection at flowering resulted in a high percentage of sterility. *O. miyabeanus* was detected in inoculated sterilized soil but did not appear to survive the summer heat in unsterilized soil. Leaf and grain infection was high under conditions of high nitrogen but this effect was lessened by the addition of phosphates. None of the local rice varieties was resistant to infection, although the fine varieties showed slightly less susceptibility. Initial leaf infection was decreased more effectively by spraying than by dusting.

In work at Delhi under the co-ordinated wheat rust control scheme the foreign variety E.931 was highly resistant to seven races of black rust (*Puccinia graminis*) [34, p. 348]. Complete freedom from yellow rust (*P. glumarum*) [loc. cit.] was exhibited by E. 740 (*T*[*riticum*] *dicoccum*), while E. 924 and E. 938 possessed good resistance. Among the Indian varieties, C. 224 and C. 228 were resistant to a mixture of all the races of *P. glumarum*. The *T. dicoccum* variety I.C. 834 was fairly resistant to *P. graminis*, *P. glumarum*, and brown rust [*P. triticina*]. Seedling resistance to all the individual races of *P. graminis* was shown by the hybrids W. 206 nos. 9 and 40. S. 128, S. 81, and S. 51 were resistant to *P. graminis* and *P. glumarum* and S. 294 to all three rusts.

At Simla two Afghan wheats, E. 731 and E. 906, yielded well and showed good rust resistance. Of the foreign varieties, E. 31 and E. 931 displayed resistance to all races of *P. graminis* and E. 740 to *P. glumarum*. Resistance to simultaneous infection by the Indian races of *P. graminis* and *P. glumarum* was exhibited by the hybrids W. 375–S. 128, W. 375–S. 81, and W. 375–S. 51. Hybrids with W. 7, W. 206, W. 246, W. 311, W. 292, W. 312, and W. 329 gave promising results in tests of both yield and rust resistance, all the progenies of the three last-named being completely free from infection. Ridley and N.P. 770 yielded well, were of good quality, and showed good resistance. The early wheats W. 375–S. 199 and S. 13 were also resistant. Three selections from the F_3 generation of the cross Gabo × N.P. 52 were highly resistant to *P. graminis*. In a strain trial, RR. 77, 79, 88, 89, 100, 106, and 134 were almost free from *P. graminis*. The rust-resistant strain N.P. 761 and hybrid 5–7–2 yielded 1,873 lb. per acre in a small-scale trial.

Orian (G.). **Plant Pathology Division.**—*Rep. Dep. Agric. Mauritius, 1953*, pp. 40–45, 1954.

Most of the information on sugar-cane diseases in this report [cf. *R.A.M.*, 33, p. 658] has already been noticed from other sources [34, pp. 321, 487]. A severe root disease associated with *Pythium* spp. was present in a few patches in three tall M 134/32 ratoon fields in Flacq.

Despite legislation passed in February, 1952, concerning the importation of maize, a serious outbreak of maize rust (*Puccinia polysora*) [33, p. 346 and below, p. 780] began in March in widely separated localities and reduced yields in some

cases by 50 to 75 per cent. Resistant varieties were introduced from West Africa for trial.

Bacterial wilt (*Pseudomonas solanacearum*) of potato [19, p. 261] was widespread as a result of an exceptionally wet year and caused a shortage of potatoes on the local market. Arran Banner from Scotch seed proved very susceptible but King George and the Australian and Mombasa stocks were more resistant. Severe attacks by *Phytophthora infestans* [14, p. 34] are also reported.

Tobacco crops on many plantations were severely affected by frog eye (*Cercospora nicotianae*) [16, p. 412] and *Alternaria* leaf spot (early blight type).

Annual Report of the Cameroons Development Corporation, 1953.—33 pp., 12 figs., [? 1954].

In the section dealing with agricultural activities (pp. 5–9) in the British Cameroons it is stated that banana losses due to Panama disease [*Fusarium oxysporum* var. *cubense*: *R.A.M.*, 29, p. 507] are increasing alarmingly and it is hoped to introduce resistant varieties. Cigar-end disease [*Verticillium theobromæ* and *Trachysphaera fructigena*: cf. 34, p. 633] also did considerable damage, but windstorms accounted for even greater loss than these diseases.

Cercospora freckle (*C. elaeidis*) [34, p. 720] in oil palm nurseries was controlled by spraying, as also was black pod of cacao [*Phytophthora palmivora*].

Renseignements phytosanitaires. [Phytosanitary information.]—*Bull. Prot. vég.* 1, pp. 20–23, 1954.

In the section of this Bulletin dealing with diseases of economic crops in French West Africa it is stated that coffee rust (*Hemileia vastatrix*) [C.M.I. map No. 5] appeared for the first time in Togoland in the area of Atakpamé in December, 1952, at Klouto in February, 1953, and Tsevie in July, 1953 [cf. *R.A.M.*, 34, p. 148]. Numerous infection foci have also appeared quite recently on the Ivory Coast, the disease having passed over the intervening Gold Coast forest belt. No doubt this will lead to the eventual infection of trees in French Guinea. [This disease has now been reported in the Gold Coast—*Commonw. phytopath. News*, 1, 1, p. 14, 1955.]

Control of Sigatoka disease of bananas (*Mycosphaerella musicola*) [*R.A.M.*, 34, p. 633] with copper salts is being attempted in lower French Guinea.

Maize rust (*Puccinia polysora*) [C.M.I. map No. 237] is now considered to be present in all the countries bordering on the gulf of Benin.

Determinaciones micológicas VI. [Mycological identifications VI.]—*Agricultura téc., Santiago*, 13, 2, pp. 166–168, 1953. [Received 1955.]

The following diseases were among those newly recorded in Chile during 1953 [cf. *R.A.M.*, 31, p. 354]: *Sclerotinia sclerotiorum* on carrot in Santiago [cf. 34, p. 120]; *Taphrina cerasi* for the third time on cherry leaves [23, p. 476], this time at San Pablo, Isorno; and *Puccinia graminis* f. *avenae* [30, p. 149] on *Phalaris tuberosa* at Chanco, determined by inoculating wheat seedlings, Bethge barley, and Stormking oats in the greenhouse with uredospores. *Phyllosticta rhododendricola* [25, p. 395] occurred on *Rhododendron* leaves from Puerto Montt de la Quinta and *Peronospora tabacina* on tobacco seedlings [C.M.I. map No. 23] from the Chagres plantation of the Chilean Tobacco Company.

Tsuyama (H.) & Sakamoto (M.). **Some observations on the behaviour of the soft-rot bacteria in the rhizosphere of Chinese Cabbage (Brassica pekinensis).**—*Rep. Inst. agric. Res. Tôhoku Univ.*, 5, pp. 79–88, 1 fig., 3 pl., 1953.

Further studies at Tôhoku, Japan, on soft-rot bacteria in soil [*R.A.M.*, 32, p. 113] showed that the root surface of Chinese cabbage was colonized by *Erwinia aroideae* [strain of *E. carotovora*: loc. cit.] and *Bacillus polymyxa*. The bacterial population

of the rhizosphere increased with the age of the plant and decreased with depth in the soil.

BRAUN (A. C.). **The physiology of plant tumours.**—*Ann. Rev. Plant Physiol.*, 5, pp. 133–162, 1954.

This further review of crown gall [*Bacterium tumefaciens*: *R.A.M.*, 31, p. 105 and next abstract] deals chiefly with the inception and development of the tumours. The biochemistry of development, the formation of secondary tumours, bacterial virulence, tumour morphology, and recovery of crown gall tumour cells are discussed. A bibliography of 228 titles is appended.

BRAUN (A. C.). **Studies on the origin of the crown gall tumour cell.**—*Abnormal and Pathological Plant Growth, Brookhaven Symposia in Biology*, 6, pp. 115–127, 3 figs., 1 diag., 1954. [Multilithed.]

In this further contribution to his studies on crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 33, p. 19 and preceding abstract] the author discusses the theories advanced to account for the origin and development of the tumours. He presents evidence indicating that their production is not due to somatic mutation or genetic changes [32, p. 475] but rather to an as yet unknown entity either of a virus-like nature and transmitted by the bacteria or possibly to part of the normal cytoplasmic system modified by bacterial action. Evidence is advanced contrary to a virus etiology in crown gall. On the other hand it is known that wounding is essential to tumour formation and it is suggested as a working hypothesis that a normal cellular component of an as yet unknown nature is elaborated in gradually increasing amounts during the early stages of wound healing, which augments cell division and then decreases as healing is completed, but which may react with a substance produced by the bacteria to form a new self-perpetuating combination that continues to develop and stimulate cell division.

MANOTAS A. (L. E.). **El contenido en azúcares y ácidos orgánicos de la mazorca de Cacao y su probable relación con ataques de enfermedades.** [The sugar and organic acid content of Cacao pods and its probable relation to disease attacks.] —*Acta agron., Palmira*, 3, 3, pp. 177–188, 2 figs., 1953.

Laboratory experiments at the Agricultural Experimental Station, Palmira, Colombia, indicated a possible close correlation between the attack on partially matured and mature cacao pods by *Monilia* [*roreri*] and *Phytophthora* [*palmivora*] and their high glucose, citric acid, acetic acid, pectin, and, in part, tartaric acid content and low tannin at these stages [cf. *R.A.M.*, 33, p. 340]. These results are considered to pave the way for experiments on the control of pod diseases [32, p. 476; 33, pp. 218, 219].

PEIRIS (J. W. L.). **A virus disease of Cacao in Ceylon.**—*Trop. Agriculturist*, 109, 2, pp. 135–138, 1 pl., 1953. [Received 1955.]

A preliminary account of the information contained in this paper on a cacao virus disease closely related to swollen shoot in Ceylon has already been noted from another source [*R.A.M.*, 33, p. 581].

CROWTHER (P. C.) & RAYMOND (W. D.). **The analysis of soil and foliage material in connection with sickle leaf disease of Cacao in Ceylon.**—*Colon. Pl. Anim. Prod.*, 4, 3, pp. 257–258, 1954.

Samples of soil and cacao foliage sent from areas in Ceylon affected by the sickle leaf disease [*R.A.M.*, 31, p. 9] were analysed at the Colonial Products Laboratory, but the results were inconclusive as to the cause of the disorder. Resampling, with suggested precautions to be taken, is recommended.

Holliday (P. C.). **The susceptibility of some Imperial College selections to witches' broom disease.**—*Rep. Cacao Res. Trinidad, 1953*, pp. 58–63, 1954.

An examination of three years' records at the River Estate, Trinidad, revealed differences in susceptibility of ICS cacao clones to witches' broom [*Marasmius perniciosus*: *R.A.M.*, 34, p. 353 and next abstract]. With a few exceptions, the clones most susceptible to pod infection also produced the most brooms. The most resistant clones were ICS 6, 45, 91, 95, and 98. Manuring, while increasing total yield, also raised the percentage of pod losses due to the disease.

Holliday (P. C.). **Spraying against witches' broom disease.**—*Rep. Cacao Res. Trinidad, 1953*, pp. 64–66, 1954.

In spraying experiments against *Marasmius perniciosus* on cacao in Trinidad [see preceding abstract] significant control was given by six or seven monthly applications of 1 and 2 per cent. Bordeaux mixture from June or July to December. Similar sprays of blitox and perenox (0·25 per cent. active material plus 0·1 per cent. albolineum sticker) gave good control of *M. perniciosus* and black pod (*Phytophthora palmivora*) [*R.A.M.*, 34, p. 353]. Lime-sulphur controlled only *M. perniciosus*. It is concluded that joint control of witches' broom and black pod might be carried out by a suitable spray programme but control of *M. perniciosus* alone is economic only in fields yielding at least 800 lb. per acre dry cocoa and where losses of 15 per cent. or more are expected.

Vallega (J.), Cenoz (H. P.), Tessi (J. L.), & Frecha (J. H.). **Importancia de las enfermedades de los cereales en 1953 y comportamiento de las variedades en el gran cultivo y en ensayos de resistencia.** [Importance of cereal diseases in 1953, reaction of the widely cultivated varieties, and resistance trials.]—*Hoja Inst. Fitotécn., B. Aires* 15, 24 pp., 9 maps, 1954. [English summary. Mimeographed.]

The following information is included in this fully tabulated, statistical survey of cereal diseases in Argentina during 1953 [cf. *R.A.M.*, 33, p. 220]. *Puccinia graminis* was of little importance on wheat, being noted on only a third of the crops surveyed, most of them in the south of the cereal region. Only seven crops had over 60 per cent. infection. Olaeta Calandria was the best of the commercially approved varieties and Guatraché Puelén and Belgrano S.F. of the provisional approvals. Races 11, 15 B, and 17 were found, the first predominating.

Although *P. rubigo-vera tritici* [*P. triticina*: loc. cit.] was very abundant, damage occurred only between Rosario and Santa Fé and only in late plantings. Against this rust Sinvalocho M.A. gave the best performance of the approved varieties in trial plantings but several strains and new selections were highly promising. Group 20 Arg. (UN 9) of *P. triticina* was more frequently encountered than the other Argentine race groups detected, viz. 15 (UN 2), 77 (UN 13), and 5 (UN 5). *P. glumarum* occurred rarely, the main focus of infection being between Nepaleofú and Arroyo de los Huesos.

P. graminis and *P. coronata* were fairly widespread on oats but caused little damage. Races 3, 4, and 7 of the former were found [33, p. 528], some isolates of 3 being able to attack Saia. Races 225, 226, 227, 236, 237, 255, 260, and 261 of *P. coronata* [loc. cit.] and two new ones predominated. *Helminthosporium teres* and *Rhynchosporium secalis* were the most common pathogens of barley; *P. hordei* was severe in nursery plots.

Thomas (I.) & Reeves (J.). **New cereal varieties in Australia.**—*J. Dep. Agric. W. Aust.*, Ser. 3, 3, 5, p. 510, 1954.

During 1953, one new wheat variety, Sherpa, one new oat variety, Bovah, and one new flax variety, Ventnor, were accepted for registration in Australia [cf.

R.A.M., 32, p. 425; 33, p. 342]; in addition, one oat variety, Acacia, accepted in 1951, is described for the first time.

Sherpa wheat (Ghurka × Amity) is susceptible to rust [*Puccinia* spp.], but resistant to flag smut [*Urocystis tritici*]. The Bovah oat variety, obtained from the crosses Bond × Victoria × Hajira, is resistant to crown rust [*P. coronata*] and *Helminthosporium* blight [*H. victoriae*: 33, p. 666], but is susceptible to stem rust [*Puccinia graminis*]. It shatters and is intended as a grazing variety; its resistance to crown rust is unassociated with susceptibility to *H. victoriae*. The Acacia oat variety, from (Victoria × Richland) × Algerian × Fulghum, is highly resistant to smut [? *Urocystis tritici*], moderately susceptible to leaf rust [*P. triticina*], and susceptible to race 8 of stem rust. Ventnor flax, obtained from the crosses ((Saginaw × Ottawa) C.I. 687 × Norfolk Earl) × Norfolk Earl, is resistant to the South Australian races of flax rust (*Melampsora lini*) [33, p. 342] and is equal or superior to Liral Crown in fibre yield and grade.

Kiesling (R. L.) & Grafius (J. E.). **Results of 1954 cereal seed-treatment trials in Michigan.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 37, 4, pp. 457–460, 1955.

In the annual seed-treatment trials at East Lansing, Michigan [cf. *R.A.M.*, 34, p. 360], wheat naturally infested with bunt (*Tilletia foetida*) [33, p. 527] and Ajax oats inoculated with smut (*Ustilago avenae* [34, p. 360] and *U. kolleri* [loc. cit.]) were treated with 16 different fungicides. Dusts gave poor control of bunt owing to the heavy spore load, and the results indicate the importance of cleaning grain before treating. Slurry and liquid treatments gave much better control through better coverage.

There were no bunted heads following agrox (0·5 oz. per bush.) or mergamma (1·5) slurries and the liquid treatments gy-trete (0·5), vancide 51 (4), merculine (0·5), and mercusol (0·5). The untreated showed 75 per cent. infection. On oats N.I. ceresan dust (0·5) and mergamma slurry (1·5) gave the best control in their respective groups, with 0·5 per cent. smutted heads, but the liquids were generally better, panogen (0·75), merculine (0·5), and Du Pont 264 and 364 (both at 0·75) all eliminating infection, which was 3 per cent. on the untreated.

Campbell (A. B.). **A monosomic analysis of Redman Wheat for stem rust resistance.**—*Diss. Abstr.*, 14, 8, p. 1131, 1954. [Received September, 1955.]

In breeding experiments at the University of Minnesota the wheat variety Redman was crossed with 21 different monosomic Chinese Spring wheats, which were selected cytogenetically. The F_2 generation was inoculated in the field with a mixture of common stem rust [*Puccinia graminis*: *R.A.M.*, 34, p. 290] races to which Redman has mature plant resistance, but a natural epidemic of race 15B, to which all the plants were susceptible, made the classification for resistance to the common races unreliable. Greenhouse inoculations of F_2 segregations with race 56 confirmed the tentative conclusion that resistance to the common races [unspecified] of *P. graminis* is carried by two complimentary factors in Chinese Spring × Redman, and located on chromosomes III and V. A tendency towards an excess of susceptible plants was ascribed to natural crossing in the F_1.

Green (G. J.) & Johnson (T.). **Effect of high temperature on the reaction of adult Wheat plants to stem rust.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22, pp. 13–14, 1954.

At the Plant Pathology Laboratory, Winnipeg, Manitoba, ten wheat varieties were tested for adult resistance to ten races of stem rust [*Puccinia graminis*: *R.A.M.*, 34, p. 286 *et passim*] at approximately 60° and 80° F. Varietal reaction in most instances was dependent upon temperature [loc. cit.; 34, p. 28] and only two of the varieties, K. 338 A. C. 2 E. 2 and K. 117 A, were highly resistant to all races at both temperatures.

Mhitaryan (M. A.). Пути выведения сортов Пшеницы, устойчивых к ржавчине [Means of producing Wheat varieties resistant to rust.]—Агробиология [*Agrobiology, Moscow*], *1955*, 1, pp. 100–106, 1955.

Investigations carried out by the Sector of Plant Protection of the Armenian S.S.R. Academy of Sciences, Yerevan, indicate that resistance to rusts [*Puccinia glumarum*, *P. graminis*, and *P. triticina*] in wheat [*R.A.M.*, 27, p. 226; 31, p. 111; 34, p. 519] can be obtained by using winter wheat for spring sowing. Martuk, obtained by selection from the local Martuninsk provenance of the variety Ukraine, and Ozyar, from a further selection from the vernalized (for six years) form of the winter wheat Altiagadzh, combine resistance and high yield.

Volosky de Hernandez (Dora). **Estudios preliminares sobre el Puccinia glumarum (Schm. Erikss) del Trigo en Chile.** [Preliminary studies on *Puccinia glumarum* (Schm.) Erikss. on Wheat in Chile.]—*Agricultura téc., Santiago*, 13, 2, pp. 159–165, 1953. [English summary. Received 1955.]

During 1950 the author studied the behaviour in Chile [*R.A.M.*, 30, p. 148] of *Puccinia glumarum* in greenhouse inoculations from 70 different sources on 11 wheat varieties. On the basis of reactions on the principal differentials, Klein Triunfo, Capelli, and Klein 157, rated on a scale from 0 (immune) to 4 (susceptible), the 70 rust samples fell into 12 different groups. The physiologic races present were determined in 1951 according to Straib's key [17, p. 231]. Sample No. 3074 belonging to race 10 was the only one included among Straib's 39 races determined up to 1937. The rest fell into five groups: I, including Nos. 2033, 3218, 3484, 3524, 3556, 3558, 3580, 3592, 3605, and 3625 (Chinese 166 and Webster wheat susceptible, Heils Franken barley immune); II, including Nos. 3265, 3458, and 3577 (Chinese 166 and Heils Franken susceptible, Webster with 2 to 2+resistance); III, Nos. 3664 and 3216 (Chinese 166 and Heils Franken immune); IV, Nos. 3561 and 2033 (Chinese 166 susceptible, Heils Franken with grade 2 resistance); and V, comprising samples showing mixed reactions. The first four groups probably include several hitherto undescribed physiologic races.

Batts (C. C. V.) & Fiddian (W. E. H.). **Effect of previous cropping on eyespot in four varieties of winter Wheat.** *Plant Path.*, 4, 1, pp. 25–28, 1955.

In 1950, winter wheat varieties growing at the Norfolk Agricultural Station, Sprowston, became severely infected by eyespot (*Cercosporella herpotrichoides*) [*R.A.M.*, 33, p. 587]. Four blocks on the infected site were cropped as follows: 1951, (1) spring barley, (2) spring barley, (3) sugar beet, (4) S.100 white clover; 1952, (1) spring barley, (2) fodder beet, (3) spring oats, (4) S. 100 white clover. In the autumn of 1952, each block was divided into five plots and sown with four varieties of winter wheat at 2½ bush. per acre and with one of them (Bersée) also at 1½ bush.

On 27th July, 1953, the percentage of severe eyespot in blocks (1) to (4), respectively, was: Bersée (1½ bush.) 23, 30·3, 9·2, and 0·5; Bersée (2½ bush.) 43·6, 28·4, 9·4, and 4·4; Hybrid 46, 29, 40·2, 11·2, and 4·2; Cappele Desprez, 16·8, 10·7, 1·3, and 1·3; and Juliana, 74·9, 63·2, 4·1, and 5·9. Taking the results for the different varieties and rates of sowing together, the mean severe eyespot in the four blocks was, respectively, 37·4, 23·5, 7, and 3·2 per cent.

In all varieties, yields tended to increase as percentage eyespot decreased. The highest yields were obtained after two years under clover (mean for all varieties 46·1 cwt. per acre), intermediate yields followed beet and oats (40·3) and barley and beet (37·1), and the lowest resulted after the two barley crops (27·6). The differences, however, partly depended on the fertilizer treatments of the previous crops. In blocks I and II, where eyespot was worst, Cappelle Desprez yielded at least 5 cwt. more grain per acre than any other variety.

Shoemaker (R. A.) & Tyler (L. J.). **Cercosporella foot rot or eyespot of Wheat in New York State.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22. p. 17, 1954.

Examinations of isolates of *Cercosporella herpotrichoides* from wheat in New York State [*R.A.M.*, 34. p. 631] and from Washington failed to show any constant differences between them. Cultural experiments at Cornell University, Ithaca, New York, with single ascospores of *Leptosphaeria herpotrichoides* also from eyespot lesions on wheat indicated that this is not the perfect state of *C. herpotrichoides*.

Duff (A. D. S.). **Resistance to 'take all' disease in Kenya Wheat 131.**—*E. Afr. agric. J.*, 20, 2, pp. 120–121, 1954.

'Take all' (*Ophiobolus graminis*) [*R.A.M.*, 31. p. 548] is second only to the rusts [*Puccinia* spp.] as a wheat pathogen in Kenya, where it causes constant loss above 7,500 ft. Hitherto none of the varieties found to be resistant has been consistently so or at all stages of growth. Kenya wheat 131, popular owing to its resistance to *Puccinia glumarum*, had been stated to be resistant to *O. graminis* as well and this claim was tested by the Kenya Department of Agriculture under conditions as near as possible to those in the field.

Five wheats, including 131, were grown in boxes in two series, the soil of one being mixed with debris of infected wheat, the other serving as control. Half of each series was later subjected to water stress. While 131 is not immune from *O. graminis*, it was shown to be resistant, developing a more extensive root system and the roots being less damaged by the fungus. Experiments on comparative crop reduction of 131 through *O. graminis* attack are still in progress.

Benedict (W. G.) & Mountain (W. B.). **Studies on the association of Rhizoctonia solani and nematodes in a root-rot disease complex of winter Wheat in south-western Ontario.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22. p. 12, 1954.

Isolations from yellowed and stunted winter wheat plants in spring consistently yielded a strain of *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 21. p. 412] in association with nematodes of the genus *Pratylenchus*. When either pathogen alone was eradicated the wheat plants were still stunted, but the removal of both resulted in a 50 per cent. increase in growth. Above 70° F. *C. solani* was more pathogenic than the nematode, below 60° the reverse was true.

Schaller (C. W.) & Briggs (F. N.). **Inheritance of resistance to mildew, Erysiphe graminis hordei, in the Barley variety, Black Russian.**—*Genetics*, 40, 4, pp. 421–428, 1955.

The barley variety Black Russian, previously found to be resistant to mildew (*Erysiphe graminis*) [*R.A.M.*, 20. p. 356] in Wisconsin, was only fairly resistant to race 3 of *E. graminis* in trials at the Department of Agronomy, University of California, Davis. The F_2 generation from crosses of Black Russian with the susceptible variety Atlas and the resistant Hanna, Goldfoil [34. p. 362], Psaknon, Algerian, Chinerme, Kwan, and Selection 175 were inoculated in the greenhouse and the subsequent infections classified [9. p. 643]. A single gene, designated Ml_{a2}, was found to condition the resistance of Black Russian to *E. graminis* race 3.

Of the ten genes so far identified which confer resistance to this race at least five are shown to be in linkage group II and their suggested linear arrangement is given.

Last (F. T.). **Effect of powdery mildew on the yield of spring-sown Barley.**—*Plant Path.*, 4, 1, pp. 22–24, 1 graph, 1955.

In a field experiment carried out in 1954 at Rothamsted Experimental Station, three plots were sown with Plumage Archer barley, susceptible to mildew (*Erysiphe graminis*) [cf. *R.A.M.*, 34. pp. 89, 362], and three with the mildew-resistant variety

Haisa II. on 22nd March and again on 5th April. One half of each plot was sprayed with lime-sulphur (1 in 80) plus 0·2 per cent. sulphonated lorol wetter at the rate of 160 gals. per acre on 13th and 26th May, 15th and 23rd June, and 8th July. Five groups of three Plumage Archer plants carrying pustules of *E. graminis* were planted in the unsprayed sub-plots of this variety on 17th May.

No mildew appeared until after the introduction of the infected plants, when it spread rapidly through the unsprayed plots of Plumage Archer. On 23rd June, the infection indices [34, p. 442] for the early- and late-sown unsprayed Plumage Archer plots were 70 and 169, respectively, the corresponding figures for Haisa II being 1·3 and 2·6.

At harvest, the mean yields of grain (in cwt. per acre) for the early-sown, sprayed, and unsprayed plots of Plumage Archer were 36·9 and 32·1 and for the late-sown 36·1 and 28·1, the corresponding figures for Haisa II being 39·5, 40·8, 41·1, and 39·7. Although spraying gave successful control it could not be carried out without mechanical damage to the crop and would be impracticable on a farm scale. It is concluded that in the absence of resistant varieties with desirable qualities the effect of *E. graminis* may best be minimized by early sowing.

Matthews (G. D.). **Progress Report 1948–1953, Dominion Experimental Station, Scott, Saskatchewan, Canada.**—52 pp., 6 figs., [? 1955].

In the section of this report dealing with animal husbandry it is stated that oats stored in the field during the winter of 1951–2 became badly moulded. Ten [unspecified] surface moulds were isolated from the oats, which were used successfully as pig feed, though it was ascertained from a series of tests that 52 lb. more of the contaminated feed was required to give the same weight gain (100 lb.).

Tessi (J. L.). **Estudio comparativo de dos bacterios patógenos en Avena y determinación de una toxina que origina sus diferencias.** [Comparative study of two bacteria pathogenic to Oats and detection of a toxin which is the origin of their differences.]—*Rev. Invest. agríc., B. Aires*, 7, 2, pp. 131–145, 1953. [English summary.]

Exhaustive studies at the Phytotechnical Institute, Buenos Aires, on the morphology and cultural, biochemical, and serological characteristics of the oat pathogens *Pseudomonas coronafaciens* [*R.A.M.*, 30, p. 515] and *P. striafaciens* [24, p. 144], the former of which produces dry lesions with a yellow halo and the latter long, wet, translucent stripes, indicated that these organisms belong to the same species. The only difference lay in the capacity of *P. coronafaciens*, when grown on media containing dextrose, to form a toxin which produces a halo on hosts other than oats, independently of the pathogen. When the power to produce the toxin had been lost after repeated subculturing, the pathogen produced symptoms on oats identical with those of *P. striafaciens*. Further work, however, is necessary before the pathogens can be combined in a single species.

Staffeldt (E. E.). **Effects of four crop rotations on soil fungi and Corn root necrosis.**—Abs. in *Iowa St. Coll. J. Sci.*, 28, 3, pp. 403–404, 1954.

In further work on maize root necrosis in Iowa [*R.A.M.*, 34, p. 521] sterilized oat straws were buried near to hills of maize in experimental rotations consisting of maize-oats, maize-oats-meadow, maize-oats-meadow-meadow and maize-maize-oats-meadow. Samples of maize roots and buried straw were lifted monthly and plated on agar. The organisms obtained are listed. There appeared to be no correlation between the amount of root necrosis and the type of rotation or the degree of occurrence of any of the organisms. The pathogenicity of various fungi to maize seedlings and their roots was determined, and it was suggested that *Pythium paroecandrum* [loc. cit.], *P. debaryanum* [33, p. 667], *Phytophthora* spp.,

Pyrenochaeta sp., and *Periconia* sp. in addition to, or even instead of, a pathogenic nematosporangiate *Pythium* sp. may be the initial cause of maize root necrosis.

Orian (G.). **La rouille du Maïs causée par Puccinia polysora.** [Maize rust caused by *Puccinia polysora*.]—*Rev. agric. Maurice*, 33, 1, pp. 20–25, 2 pl., 1 map, 1954.

The occurrence of maize rust (*Puccinia polysora*) in Mauritius in 1953 has already been noticed from other sources [see above, p. 772]. This paper gives an account of the fungus in the island and its arrival there. Most of the maize planted between May and June escaped infection.

Gaudineau (M[arguerite]) & Messiaen (C. M.). **Quelques maladies cryptogamiques sur épis, tiges et feuilles de Maïs.** [Some cryptogamic diseases on ears, stalks, and leaves of Maize.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 5 (*1954*), 3, pp. 273–299, 13 figs., 1955.

Notes, based largely on the literature, are given on the symptoms and causal organisms of the following diseases of maize [cf. *R.A.M.*, 30, p. 607], seldom recorded in France, but observed occasionally in recent years in the south-west of the country: ear rots due to *Gibberella zeae*, *G. fujikuroi* and its var. *subglutinans* [C.M.I. maps Nos. 102, 191], *Fusarium poae*, *Physalospora zeicola*, *Nigrospora oryzae*, and *Diplodia frumenti*, damping-off (*Fusarium* and *Diplodia* spp.), mouldiness of seeds caused by *Cladosporium herbarum*, *Penicillium*, *Aspergillus*, and *Rhizopus*, charcoal rot (*Macrophomina phaseoli*), anthracnose (*Colletotrichum graminicola*), and leaf burn (*Helminthosporium turcicum*) [No. 257].

Seed treatment is of secondary importance, compared with the use of clean seed obtained from healthy plants. In the region concerned the maize stalks should be burnt during autumn and not left in the fields until the following spring, as they are at present.

Muntañola (María). **Bacterias y hongos que atacan a los Sorgos cultivados en la provincia de Tucumán.** [Bacteria and fungi attacking cultivated Sorghum in the province of Tucumán.]—*Rev. agron. Noroeste Argent.*, 1, 2, pp. 99–133, 7 pl., 1954. [English summary.]

The information in this paper has been largely noticed from other sources [*R.A.M.*, 33, pp. 667–669]. Notes are given on the taxonomy, history, symptoms, and microscopic characters of twelve diseases of sorghum occurring in the province of Tucumán, Argentina, together with field observations and control measures. The latter are based on those employed in the United States and have yet to be tested in Argentina. A bibliography of 63 titles is appended.

Morwood (R. B.). **Citrus canker.**—*Agric. J. Fiji*, 25, 1–2, pp. 15–16, 1954.

A brief general account is given of citrus canker (*Xanthomonas citri*) and its control. In Fiji [*R.A.M.*, 31, p. 551] the agricultural department has cleared a large part of the originally infected area between Nausori and Navira and is watching for and dealing with outbreaks elsewhere. Surveys are followed by digging out and burning of affected and adjacent trees, later inspections being made to detect subsequent infections. Mandarins are reported to be fairly resistant and kumquats highly so. A ban is imposed on the introduction into Fiji of all citrus from countries affected by the disease.

Battiato (C.). **Osservazioni morfo-istologiche sui picnidi di Deuterophoma tracheiphila Petri.** [Morpho-histological observations on the pycnidia of *Deuterophoma tracheiphila* Petri.]—16 pp., 6 figs., Catania, Ministero dell' Agricoltura e delle Foreste, 1953. [German, English, and French summaries.]

Studies at the Istituto Tecnico Agrario Statale, Caltanissetta, Sicily, on fresh

samples of sweet and sour orange, lemon, and mandarin affected by mal secco (*Deuterophoma tracheiphila*) [*R.A.M.*, 27, p. 318 and next abstract] demonstrated that the pycnidia are generally globose, ostiolate bodies which are to some extent polymorphous. Typically they appear to have a small, hollow neck terminating in an ostiole, but the former may be greatly abbreviated or absent, depending on the host and on the position in which the fructifications are formed. The most typical pycnidial forms developed on orange, while the modified types developed on lemon and mandarin.

Ruggieri (G.). **Periodicitá nelle infezioni di 'mal secco' e fondamentali orientamenti di lotta.** [Periodicity in infection by mal secco and basic principles in its control.]—Reprinted from *G. Agric.*, 34 (*1953*), 8 pp., 2 figs., 1953.

Pot experiments at the Experiment Station for Citrus Culture, Acireale, Sicily, using 18-month-old sour orange seedlings, demonstrated that primary infection by *Deuterophoma tracheiphila* [*R.A.M.*, 34, p. 449 and preceding abstract] occurs only from November to February, and chiefly in January when the plant is dormant, irrespective of climatic and environmental conditions. Therefore phytosanitary treatments should be applied at the beginning of this period and any possible sources of primary infection destroyed.

DeWolfe (T. A.), Klotz (L. J.), Moore (P. W.), & Hashimoto (S.). **Effects of mulches on Citrus orchards.**—*Calif. Citrogr.*, 39, 12, pp. 422, 436–437, 5 figs., 1954. [Received 1955.]

Isolations from wood shavings used to mulch an irrigated lemon grove in California yielded *Trichoderma* [*R.A.M.*, 34, p. 366], which parasitized *Phytophthora citrophthora* and *P. parasitica* when grown with them [12, p. 192 and next abstract]; *Arthrobotrys oligospora* [34, p. 647], *Dactylella gephyropaga*, *D. leptospora*, and others, tentatively identified as *D. bembicodes* [32, p. 126] and *Dactylaria brochopaga* [34, p. 150], captured and killed citrus nematode [*Tylenchulus semipenetrans*] larvae in culture. All except *Dactylella leptospora*, not yet isolated, appear to be well distributed in citrus soils. Although the grove had a history of *Phytophthora* brown rot and gummosis, the causal organisms were recovered from the soil only after repeated attempts. The mulch had increased fruit yields from 300 to 1,100 boxes per acre in the second and third years.

Klotz (L. J.). **Citrus disease review.**—*Calif. Citrogr.*, 39, 12, pp. 455, 458–459, 1954. [Received 1955.]

Much of the information contained in this popular adaptation of a report summarizing trials and findings on citrus diseases [in California] has already been noticed from time to time in this *Review*.

Within a citrus grove rejuvenation project, investigations into fibrous feeder root decay showed that a conjunction of *Phytophthora* spp. [*R.A.M.*, 32, p. 310 and preceding abstract] with a high water table and the presence of organic matter caused up to 87 per cent. of the destructions of feeder roots of sweet citrus seedlings; whereas the fungi alone accounted for only 1·43, and a high water table alone for only 0·22 per cent. of the rot. The source of nitrogen also influenced root decay.

Successful cultivation of stem tissues from healthy young trees and those infected with quick decline virus [see next abstract] on artificial media should render possible a technique for screening compounds for chemotherapeutic control.

Citrus vein enation virus [*R.A.M.*, 32, p. 622] is a new disease and search continues for possible effects of this virus on the host.

Extensive experiments on twig die-back [27, p. 562] seem to confirm its resulting from a soil too dry, cold, or salty to permit root absorption to keep pace with transpiration. Organisms isolated from diseased trees seem to be secondary.

In tests designed to find fungicides harmless to citrus but active against brown rot [*Phytophthora* spp.: 34, p. 641], *Septoria* spot [*Septoria* spp.: loc. cit.], *Botrytis* blossom blight [*B. cinerea*: 32, p. 555], and bacterial blast [*Pseudomonas syringae*: 30, p. 34], some copper-zinc chromates, one copper-aluminium-iron compound, and ferric ethylene bisdithiocarbamate showed promise, one application of the last controlling *Botrytis* blight for two weeks.

Inoculation of nucellar Eureka lemon trees with an infectious graft-transmissible agent, probably a virus [see next abstract], caused significant retardation of sweet orange, sour orange, and grapefruit rootstocks, while a vigorous Lisbon lemon selection was unaffected.

The results of inoculation experiments proved *Phomopsis* [*Diaporthe*] *citri*, *Botrytis cinerea*, *Diplodia* spp. [30, p. 34; 31, p. 543], and *Dothiorella gregaria* [*Botryosphaeria ribis*: 26, p. 111; 34, p. 660] to be important factors in the dry bark disease [27, p. 519]; they usually enter shell bark lesions, causing pitting and gummosis. Tests for suitable fungicides are in progress.

Hydrated lime added to copper sprays lessened copper injury to lemon foliage, fruits, and twigs in southern California and sometimes improved the control of *Phytophthora citrophthora* on the fruit.

Wood-pocket [27, p. 471] killed some semi-dense Lisbon lemon seedlings, both nucellar and gametic, derived from diseased trees. This disease does not appear to be transmissible to healthy trees and can be avoided by using healthy sources.

Ferment gum or Rio Grande gummosis [32, p. 621] was reproduced by inoculations with pure cultures of an unidentified wood rotting fungus.

Most of the information concerning avocado diseases has already been noticed from time to time in this *Review* [34, p. 660]. Root rot caused by *Phytophthora cinnamomi* [34, p. 735] is probably not native to southern California, but was spread by soil movement and infected nursery stocks. In field spray trials to reduce *Dothiorella* [*B. ribis*: 33, p. 243] fruit rot of Fuerte avocados in coastal areas, yellow copper oxide, Bordeaux mixture, and a copper-zinc chromate were most effective; copper-8-quinolinolate and zineb were effective in years of moderate rainfall.

Verticillium albo-atrum [29, p. 105] was found to be the cause of 'collapse', to which Guatemalan rootstocks are more susceptible than Mexican ones.

Lemon tree decline linked to virus.—*Calif. Citrogr.*, 39, 11, p. 413, 1954. [Received 1955.]

Evidence secured by E. C. Calavan, J. M. Wallace, and L. G. Weathers at the Citrus Experiment Station [California] showed that lemon tree decline [*R.A.M.*, 34, p. 639] is at least partly due to a pathogen transmitted by budding or grafting.

Young-line Frost and UCLA nucellar Eureka lemon trees, grafted on sweet orange, sour orange, and grapefruit rootstock, six years after inoculation with buds from diseased trees, showed a significant retardation of growth in tests conducted on many pairs of trees in one orchard near Oxnard. There was no relative change in old-line Eurekas inoculated at the same time, which indicates that the pathogen was already present in both inoculated and non-inoculated trees.

It is suspected that the agent is a virus, but proof is not yet complete. Symptoms, which were slow to appear but once apparent increased steadily, included loss of vigour and decreased production of fruit; they were first noticed in California about the turn of the century. The discovery in 1946 that quick decline of orange trees [loc. cit.] was caused by a virus suggested that lemon tree decline might result from the same virus, but this was disproved by experiments.

Since the pathogen has apparently not become established in young-line Eurekas, which were developed from old-line trees by a special genetic technique, growers can obtain resistant orchards by selecting rootstock and buds.

Wallace (J. M.) & Drake (R. J.). **Tristeza virus in Meyer Lemon.**—*Calif. Citrogr.*, 40, 3, pp. 84, 95–96, 1955.

The tristeza virus [*R.A.M.*, 34, p. 366] was found in 38 out of 40 Meyer lemon trees [34, p. 640] in 15 counties of California, some trees only one bud-generation removed from the original introduction of Meyer lemon from China in 1908. Although other sources cannot be excluded, and there is evidence that there were other introductions, the virus plainly came with Meyer lemon and was distributed with the increase of this strain. Meyer is usually incompatible with sour orange rootstocks, a fact which further supports this theory.

The discovery of a 'sour orange-tolerant' Meyer strain, the Ricketts lemon, and of two apparently virus-free Meyer trees in California indicates that virus-free buds can be obtained from infected trees. The virus spreads very slowly or not at all to adjacent citrus trees, but the reasons for this have not yet been investigated.

Lauriol (Mlle F.). **Les traitements chimiques des Pénicillium des Agrumes.** [Chemical treatments of *Penicillium* on Citrus.]—*Fruits Prim. Afr. N.*, 24, 254, pp. 70–80, 2 figs., 13 graphs, 1954.

The information in this article on the control of *Penicillium* spp. on citrus has already been noticed from a different source [*R.A.M.*, 34, p. 642].

Gutter (Y.) & Littauer (F.). **Antagonistic action of Bacillus subtilis against Citrus fruit pathogens.**—*Bull. Res. Coun. Israel*, 3, 3, pp. 192–196, 10 figs., 1953.

At the Agricultural Research Station, Rehovot, Israel, two isolates of *Bacillus subtilis*, obtained from contaminated cultures of *Diplodia natalensis* and *Sclerotium bataticola* [*Macrophomina phaseoli*], were found to be antagonistic to a number of fungi isolated from decaying citrus fruits [cf. *R.A.M.*, 33, p. 105]. Growth of *Penicillium digitatum* was totally suppressed. *B. subtilis* stimulated the fructification of fungi which form fruiting bodies, such as *Diplodia* and *Phomopsis*, but inhibited reproduction by conidia. The growth of *B. subtilis* was strongly inhibited by *D. natalensis*. The practical use of the antibiotic from *B. subtilis* for the control of fruit rots is worth further investigation.

Warning to Citrus packers using the new mould control treatment.—*Agric. Gaz. N.S.W.*, 66, 3, pp. 134–135, 1 fig., 1955.

The new dip treatment against green mould (*Penicillium digitatum*) [*R.A.M.*, 34, p. 448] may cause rind injury unless the alkalinity of the sodium *o*-phenyl phenate solution is carefully controlled and checked daily; early navel oranges are particularly susceptible. To avoid rind injury it is essential that the temperature of the solution should not exceed 90° F., the fruit should be dipped no longer than two minutes, and be rinsed in clean water.

Reuther (W.), Smith (P. F.), & Skudder (G. K.). **Relation of pH and soil type to toxicity of copper to Citrus seedlings.**—*Proc. Fla hort. Soc.*, 66, pp. 73–80, 3 figs., 2 graphs, 1954.

In further work in this series [cf. *R.A.M.*, 33, p. 26] pot experiments in Florida demonstrated that acid, sandy soils with 1·5 to 3 milli-equivalents of exchange capacity per 100 gm. are unfavourable for normal growth of citrus seedlings when there is 120 to 240 lb. or more of copper oxide per acre-six-inches, and that acid soils with 4 to 6 milli-equivalents of exchange capacity would have an equivalent degree of toxicity at 320 to 480 lb. copper oxide per acre. Comparable concentrations of zinc and manganese are not toxic to citrus. The toxicity of copper is reduced by the addition of lime and possibly by the presence of a large phosphate content in the soil. Prominent iron chlorosis symptoms [loc. cit.] are not always associated with copper toxicity.

Bingham (F. T.), McColloch (R. C.), Liebig (G. F.), & Vanselow (A. P.). **Fluoride injury to Citrus.**—*Calif. Agric.*, 8, 5, pp. 12, 15, 1954.

In investigations carried out in California to determine the effect of fluorine [cf. *R.A.M.*, 33, p. 168 and next abstract] on the growth of citrus trees considerably higher concentrations of fluorides (maximum 211 p.p.m.) were detected in leaves in industrial areas than in areas far removed from air pollution. No field evidence of leaf scorch or burn on citrus due to fluoride was noticed.

Haas (A. R. C.) & Brusca (J. N.). **Fluorine toxicity in Citrus.**—*Calif. Agric.*, 9, 3, pp. 15–16, 6 figs., 1955.

At the University of California, Riverside, experiments were designed to show the effect on rooted leafy-twig lemon cuttings grown in sand cultures of various concentrations of fluorine [see preceding abstract] in the form of sodium or potassium fluoride added to the nutrient solution.

At a concentration of 50 p.p.m. fluorine, effects on leaf size and plant growth were apparent and at 400 p.p.m. there was severe leaf injury and defoliation. Sweet orange seedlings receiving 400 p.p.m. suffered a loss of chlorophyll at the leaf tip and the new leaves were reduced.

Mesa Bernal (D.). **'Alunamiento del Coco', 'asoleadura' o 'mancha de la nuez'. Consideraciones sobre la enfermedad del Cocotero comunmente conocida con estos nombres.** [Debility of the Coco-nut, sunburn, or nut spot. Considerations on the disease of Coco-nut commonly known by these names.]—*Agricultura trop.*, 10, 3, pp. 17–27, 2 figs., 1954.

The author gives the history, symptoms, and current theories concerning the cause of a disease of coco-nut fruits which has been present in Colombia for some years and is particularly prevalent in the banana-growing region where more than 70 per cent. of about 300,000 trees are affected. Experiments to determine whether it is caused by a mineral toxicity are envisaged. The disorder generally originates with a lesion between the nut and the calyx which enlarges to a widespread necrosis, the outside of the nut being streaked longitudinally in varying widths according to the degree of the disorder and state of development of the nut. The disease causes much premature dropping of young nuts [*R.A.M.*, 29, p. 35].

Meiffren (M.). **Une maladie des Caféiers en pépinière causée par Rhizoctonia bataticola (Taub.) Butler.** [A disease of nursery Coffee plants caused by *Rhizoctonia bataticola* (Taub.) Butler.]—*Bull. Cent. Rech. agron. Bingerville* 9, pp. 45–52, 2 pl. (1 col.), 2 figs., 1954.

Many coffee seedlings die in nurseries in various parts of the Ivory Coast; about 20,000 have been lost at Daloa alone. Seedlings from Daloa, Gagnoa, and Bingerville examined in the laboratory of the Agronomy Research Centre, Bingerville, bore the following symptoms. Browning and blackening at the collar is succeeded by an extensive necrotic lesion, the roots turn brown, the leaves wither, and the whole plant dies. The process is accelerated by excessive humidity and shade. The causal fungus was identified as *Rhizoctonia bataticola* belonging to Haigh's sclerotial group A [*R.A.M.*, 9, p. 685; 12, p. 727] and therefore not included in *Macrophomina phaseoli* [cf. 31, p. 282].

In pathogenicity tests six-month-old Ineac robusta seedlings (*Coffea canephora* var. *robusta*) were wound-inoculated with mycelial fragments at collar level. The initial collar-browning was observed after three days, leaf-browning after ten, and death ensued after 13 days. In another test, in which the seedling roots were dipped in a five-day-old liquid culture, necrosis was visible after eight days and the collar lesion after 14. Sclerotia developed on the hair roots. In a third test seedlings set out in soil sprayed with a similar inoculum developed the collar lesion after 15

days and the tap root became affected 1 to 2 cm. below the collar. It appears, therefore, that the fungus can gain entry, without wounding, through the roots and can survive in the soil.

To control the disease the soil must be cleared of plant debris and disinfected, an easy method being the application of a 2·5 per cent. formalin solution three weeks before sowing, at 10 to 12 l. per sq. m. During growth proprietary fungicides may also be applied.

Bigi (F.). **Gli ambienti, i parassiti e le malattie del Cotone in Africa orientale (Eritrea, Etiopia, Somalia).** [The environmental conditions, parasites, and diseases of cotton in East Africa (Eritrea, Ethiopia, Somalia).]—*Riv. Agric. subtrop.*, 48, 4–6, pp. 113–129, 1954.

The following cotton diseases were observed in former Italian East Africa during the author's tenure of office from 1936 to 1940. *Rhizoctonia* [*Corticium*] *solani* [cf. *R.A.M.*, 33, p. 602] occurred repeatedly in Somalia on newly germinated seedlings and occasionally prevented germination. Similar damage was observed in May, 1939, at Adama, on the varieties Acala, Delfos, and Stoneville. *Bacterium* [*Xanthomonas*] *malvacearum* [C.M.I. map No. 57] occurs throughout the territory but has only appeared in Somalia since 1939 and is confined to Acala cotton near the Agricultural Centre at Alessandra. *Ramularia areola* [No. 260] was first reported from Somalia in 1931 and observed in a field of Acala at Alessandra in August, 1939. Up to the present infection is very limited. The disease does not occur in Ethiopia or Eritrea. *Uredo gossypii* [*Phakopsora desmium*: No. 258] appears to be the most common pathogen in Somalia but causes little damage. It has been identified tentatively in various parts of Ethiopia. An *Alternaria* sp., probably *A. macrospora* [cf. *R.A.M.*, 32, p. 91], was observed chiefly on the lower leaves of a planting of Carcabat and Acala cotton near Agordat, Eritrea, in December, 1938, and subsequently on both imported and indigenous varieties in eastern and western Ethiopia and central Auasc. A spotting limited to the older leaves was observed on Acala in the lowlands of western Eritrea in November, 1938, and on a smaller scale on Sakellaridis in the lower Giuba region in August, 1939. The pathogen was tentatively identified as *Sphaerella* [*Mycosphaerella*] *gossypina* [29, p. 89]. *Nematospora gossypii* [C.M.I. map No. 153] was found to be the cause of an extensive boll rot of immature cotton previously attributed to *Dysdercus cardinalis*, now established to be the disseminator of the disease. This fungus and another *Nematospora* sp. [? *N. coryli*: No. 163] is probably responsible for the greatest damage to cotton in the territory. A basal boll rot of a serious nature, probably due to *Colletotrichum* [*Glomerella*] *gossypii* [*R.A.M.*, 33, p. 602] was found in the Dugambia region of western Eritrea in November, 1938. It was localized, however, and did not develop elsewhere. *Fusarium*, *Alternaria*, and *Cladosporium* spp. were frequently isolated from bolls damaged by insects and other agents.

So far the control problem has not been tackled but it is worth noting that measures taken in Somalia to limit *Dysdercus* infestations have markedly reduced the incidence of *Nematospora*.

Mains (E. B.). **Some entomogenous species of Isaria.**—*Pap. Mich. Acad. Sci.*, 40 (*1954*), pp. 23–32, 1 pl., 1955.

The author discusses the genus *Isaria* [*R.A.M.*, 30, p. 38; 34, p. 300] with *I. farinosa* as lectotype and limits it to the stilbaceous condition in which synnemata are produced. *I. tenuipes* and *I. atypicola* are described on insects in the United States. Notes are given on the doubtful species *I. cicadae*, *I. pattersonii*, *I. dussii*, *I. dubia*, *I. japonica*, *I. ritchei* (a *Cephalosporium*), and a number since transferred to other genera.

Lingappa (B. T.). **Two new species of Physoderma from India.**—*Mycologia*, 47, 1, pp. 109–121, 30 figs., 1955.

Full descriptions are given of *Physoderma corchori* n.sp. and *P. commelinae* n.sp., found at Banaras, India, the former a highly destructive parasite of jute (*Corchorus olitorius*) and also found on wild jute (*C. acutangulus*), the latter attacking, *inter alia*, species of *Commelina*.

P. corchori is characterized by an intracellular, profusely branched, tenuous rhizomycelium 1·5 to 2 μ in diameter with numerous fine rhizoids and many one- or two-celled, intercalary, spherical, or spindle-shaped swellings. The subspherical or globose resting sporangia, of which many are present in each cell, measure 19 to 30 (average 24) μ in diameter and have a circular depression on one side. The smooth, dark brown exospore is 1·5 μ thick. The resting sporangium germinates by protrusion of the endosporangium, which pushes aside a hat-shaped operculum measuring 14 to 18 μ in diameter. Each sporangium contains about 40 oval zoospores measuring 3·5 to 6 μ, with blunt ends, a flagellum 18 μ long, and an eccentric, refractive globule near the anterior end.

The disease, which is of considerable economic importance, appears early in August, when the jute plants are frequently submerged. By the end of September the stem, branches, petioles, and midribs are covered with hemispherical, dark brown galls. On the leaves the galls occur only on the midribs. Heavy infection, though not fatal, may cause stunting. The overcrowded galls on the lower parts of the stem, which remain under water for a considerable time, become cracked, decay, and appear erumpent and crustaceous. The galls on all the aerial parts remain hard and non-erumpent long after the death of the host at the end of the season.

The rhizomycelium invades the stem tissues as far as the phloem, but does not penetrate the xylem or pith. Infection of the phloem damages the fibre cells and thus affects the quality of the retted fibre, the strands becoming shattered and discontinuous.

Crandall (B. S.), Parrado Alvarez (J. L.), & Roque Pérez (R.). **Las enfermedades del Kenaf y su control.** [Diseases of Kenaf and their control.]—*Circ. agric. Minist. Agric. Cuba* 4, 30 pp., 10 figs., 1 diag., 1953.

The following diseases of kenaf (*Hibiscus cannabinus*) are considered with special reference to Cuba. Pre- and post-emergence damping-off, caused by *Rhizoctonia* [*Corticium*] *solani*, is prevented by sprinkling the seed about five days before sowing with granosan at 2 oz. per 100 lb. seed. Root rot (*Phytophthora parasitica*) [*R.A.M.*, 19, p. 220], the most serious root disease, causes severe losses following heavy rainfall, particularly on poorly drained or exceptionally heavy soils. Collar rot (*Sclerotium rolfsii*) [loc. cit.] is generally the cause when 15 or 20 plants wilt simultaneously. Control lies in crop rotation and avoiding an excess of organic matter in the soil. Charcoal rot (*S. bataticola*) [*Macrophomina phaseoli*: 31, p. 489] generally attacks plants already weakened by adverse nutritional factors. The symptoms of zonate leaf spot (*C. solani*) [28, p. 65] are aggravated by heavy rainfall, although the damage may not be extensive. The stems may also be affected. A preventive spray with 2–1–100 Bordeaux mixture is generally effective and the variety Maceo is apparently resistant.

Anthracnose (*Colletotrichum hibisci*) [32, p. 79] was first observed in Cuba in 1950, causing severe losses throughout the island, but it may have been present on the seed some years previously. The outbreak was utilized to eliminate all susceptible strains and build up resistance by natural selection. The mechanism of resistance is a complex of the resistance of the plant to initial penetration by the fungus and its subsequent reaction. Seed treatment with granosan M at the rate of 2 oz. per 100 lb. seed five to seven days before sowing is recommended until the newly

developed resistant varieties Cubano, Cuba 797, and Maceo are available. Powdery mildew (*Leveillula taurica*) [31, p. 384] causes partial or complete defoliation during periods of high humidity, but this is generally after the plant has attained its maximum development. A mosaic-type virus [cf. 31, p. 489] occurs to a limited extent.

Nine basic recommendations for avoiding the above diseases are enumerated, and special instructions are given for seed treatment against anthracnose.

Plant diseases. Diseases of Gladiolus.—*Agric. Gaz. N.S.W.*, 66, 3–4, pp. 139–144, 212–220, 23 figs., 1955.

The symptoms of diseases affecting *Gladiolus* [cf. *R.A.M.*, 25, p. 303] in New South Wales are described and directions given for their control. No direct treatment exists against yellows and basal brown rot (*Fusarium oxysporum* f. *gladioli*) [cf. 32, p. 562; 33, p. 231], but outbreaks may be prevented by testing new corms for internal infection by cutting a slice from the side; this will not damage a healthy corm. Quarantine is suggested for new introductions, and should a variety be affected by yellows all plants should be destroyed. Spores on the surface of corms will be killed by fungicidal dips [cf. 31, pp. 119, 542].

Penicillium [*gladioli*; cf. 30, p. 107] corm rot develops in damp storage; care in handling, quick drying after lifting, and destruction of diseased material are recommended.

Against leaf spots caused by *Botrytis gladiolorum* [cf. 34, p. 38] and *Stemphylium botryosum* [*Pleospora herbarum*: cf. 27, p. 566] the crops should be sprayed regularly at seven- to 20-day intervals with 1–1–20 Bordeaux mixture plus 1 oz. white oil per gal.; old flower heads should be removed and trash burned. The crop should be dug preferably five to six weeks after flowering and the corms thoroughly dried, and where leaf spot has occurred or the weather is damp corms must be freed from soil and dipped (with husks) in phenyl mercury acetate emulsion for 15 to 30 minutes. They are best kept in cool storage (38° to 48° F.) or an airy shed, and must be planted immediately on removal from cool storage. An eight hours' dip in a solution of 4 oz. of mercuric chloride in 25 gals. water (plus 1 oz. of common salt dissolved in hot water) before planting is recommended. Alternatively, acid mercuric chloride treatment (4 oz. plus 2 pints hydrochloric acid in 25 gals. water) for 5 mins. or 1 lb. mercurous chloride in 4 gals., plus wetting agent for 5 to 10 mins. can be used [cf. 32, p. 255].

Against hard rot (*Septoria gladioli*) [cf. 32, p. 562] 24 to 48 hours' steeping in phenyl mercury acetate showed some promise, though it may scald the surface of mercury-sensitive varieties. After treatment corms should be dried and stored in well aerated conditions. Old containers must be disinfected for a few minutes in a 1 in 50 formalin solution and dried in open air.

Bald (J. G.). **Gladiolus diseases.**—*Conv. N. Amer. Gladiol. Coun.*, 8, 11 pp., 1953. [Mimeographed.]

In this discussion of gladiolus diseases at the eighth annual convention of the North American Gladiolus Council, held at Cleveland, Ohio, in January, 1953, it is stated that *Fusarium* yellows [*F. oxysporum* f. *gladioli*: *R.A.M.*, 33, p. 483] is the most important disease, involving an annual loss of $1\frac{1}{2}$ million dollars in Florida alone. After heat-curing [33, p. 83] the best storage conditions for the corms are 40° F. and a relative humidity of 70 to 80 per cent. A new hot-water treatment still under investigation is outlined; it kills all corm-borne diseases except viruses and scab [*Bacterium marginatum*: 33, p. 483]. Dead or mummified corms having been removed, the fully dormant corms are immersed in water at 135° for 30 minutes, then cooled, dried, and stored. Full dormancy is essential for this treatment and the stage of dormancy may be ascertained by the depth of colour

produced in the vascular region after staining cut corms with 1 per cent. 2–3–5-triphenyltetrazolium chloride. Notes are also given on the symptoms, incidence, and control of *Botrytis* [*gladiolorum*: 33, p. 83], *Stemphylium* [32, p. 190], *Sclerotinia* [*gladioli*: 33, p. 83], *Bacterium marginatum*, and *Curvularia* [33, p. 484].

Gladiolus stunt [33, p. 73] is believed to be due to a virus, though this is not yet confirmed, and is the most serious disease of this nature, occurring frequently in Chamouny, Spic and Span, Elizabeth the Queen, and some other varieties. The plants become stunted and produce short spikes. Other virus diseases occurring on this host are also briefly described [33, p. 84]. Gladioli are somewhat susceptible to boron deficiency and are occasionally affected by zinc toxicity from nabam sprays, characterized by small white oval spots on the leaves.

Keller (J. R.). **Investigations on Chrysanthemum stunt virus and Chrysanthemum virus Q.**—*Mem. Cornell agric. Exp. Sta.* 324, 39 pp., 8 figs., 1953.

Chrysanthemum stunt virus [*R.A.M.*, 33, p. 83; 34, p. 723] has been experimentally transmitted by grafts, sap inoculation, and by a species of dodder (*Cuscuta gronovii*), but only to certain members of the Compositae, although hosts in 27 families were tested. Symptom expression normally occurs in healthy plants three to four months after inoculation, but this period can be reduced to six to eight weeks by defoliation or etiolation. There is not sufficient movement of virus from inoculated leaves to establish infection elsewhere in the plant before 35 to 45 days. The inactivation temperature of the virus is between 96° and 100° C., it resists freezing *in vitro* for a year, and is infectious for at least two years in dried tissue. Chrysanthemum virus Q [32, p. 679] combined with stunt virus to produce severe distortion.

Geoffrion (J. M.). **La culture du Chrysanthème. II. Maladies, insectes, et autres ennemis.** [The cultivation of the Chrysanthemum. II. Diseases, insects, and other enemies.]—*Rev. Oka*, 28, 2, pp. 40–44, 1954.

Brief notes are given in popular terms on the symptoms and control of the chief diseases of glasshouse chrysanthemums in Quebec Province, particularly in Montreal. These are dwarfing [? stunt virus: see preceding abstract], the most prevalent disease, *Verticillium* wilt (*V. dahliae*) [see next abstract], still an important problem, rust (*Puccinia chrysanthemi*) [*R.A.M.*, 33, p. 710], grey mould (*Botrytis cinerea*) [32, p. 63], powdery mildew (*Erysiphe cichoracearum*) [cf. 31, p. 248], and leaf spot (*Septoria chrysanthemi*) [28, p. 127].

Wilhelm (S.) & Sciaroni (R. H.). **Verticillium in Chrysanthemum.**—*Calif. Agric.*, 8, 5, pp. 9–10, 2 figs., 1 diag., 1954.

Chrysanthemum *Verticillium* disease [*V. dahliae*: *R.A.M.*, 30, p. 108], severe on the most important commercial varieties Albatross, Indianapolis, Waite, Pocket, White Mensa, J. W. Prince, and Paul Miller in northern California, is controlled successfully by yearly fumigation of land cropped continuously with chrysanthemums. Chloropicrin (3 ml. per sq. ft. of soil) reduces infection at the end of the season to less than 10 per cent. compared with 70 to 80 per cent. with 2 or 2·5 ml. Injections are made with a hand fumi-gun to a depth of 6 in. and 12 in. apart in soil prepared for planting: a $\frac{1}{2}$ to 1 in. water seal or a plastic cover is then applied and two weeks are allowed for the gas to escape before planting. Tractor-drawn power-injection machinery has given promising results. Only culture-indexed, *Verticillium*-free plants should be planted in fumigated beds.

Miller (J. H.) & Jenkins (Anna E.). **A new species of Elsinoë on southern Magnolia.**—*Mycologia*, 47, 1, pp. 104–108, 5 figs., 1955.

Mature ascocarps of *Sphaceloma magnoliae* [*R.A.M.*, 32, p. 21], which causes a

leaf scab of *Magnolia grandiflora* in the southern United States, having become available, a diagnosis of the fungus as *Elsinoe magnoliae* n.sp. is presented. The ascocarps are 90 to 240 μ in diameter by 20 to 40 μ thick and form an epithecium 10 to 15 μ thick; the asci measure 17·5 to 30 by 14 to 20 μ and the ascospores 9 to 14 by 3·5 to 6 μ; they are irregularly arranged, clavate-ellipsoid, 3-septate, with an occasional longitudinal wall. The acrogenous, one-celled, ellipsoid, hyaline conidia are borne on short apiculae and measure 6 to 12 by 3 to 5 μ. The sporodochia resemble those of *S. perseae* [13, p. 386].

Muntañola (María). **Sobre la presencia de la roya del Girasol (Puccinia helianthi Schw.) en Tucumán.** [On the presence of Sunflower rust (*Puccinia helianthi* Schw.) in Tucumán.]—*Rev. agron. Noroeste Argent.*, 1. 2. pp. 213-215. 1 fig., 1954. [English summary.]

Sunflower rust (*Puccinia helianthi*), first discovered in Argentina in 1952 [*R.A.M.*, 33, p. 262], is reported for the first time in Tucumán Province, causing severe damage at Obanta, Manantial, and in neighbouring areas. In some cases the teleutospores were parasitized by *Darluca filum* and the presence of a spore-eating cecidomyid larva is noted.

Weimer (J. L.). **Lupine anthracnose.**—*Circ. U.S. Dep. Agric.* 904, 17 pp., 1 fig., 1952.

This bulletin gives a detailed description of anthracnose (*Glomerella cingulata*) of blue lupin (*Lupinus angustifolius*), much of which has already been noticed [*R.A.M.*, 29, p. 417 *et passim*]. The seed-borne causal fungus survives about 18 months in storage but is killed after ten minutes in hot water at 51° C. The optimum temperature for the growth of this strain of *G. cingulata* in culture is 25°; death occurs after five days at 39·5°.

The fungus may be controlled by exposure of infected seed, dried to about 12 per cent. moisture content, to an air temperature of 75° for three hours, but germination is retarded by this treatment. Hot-water treatment also kills the pathogen but damages the seed. A three- or four-year rotation is of some value as a control measure.

Inoculation tests with *G. cingulata* on the lupin strain grown in the south-eastern United States failed to show any evidence of resistance. The imported blue lupins rated highly resistant in the early stages of growth by the same tests included the plant introductions P.I. 167938, 167939, 167941, 167942, 167943, 168526, 168528, 168529, 168532, 168533, 168534, 168535, 168536, and 180709. The resistance of pods and seeds of P.I. 167938, 168529, and 168535 was shown in limited tests to be less than that of the stems.

Sprague (R.). **Check list of the diseases of grasses and cereals in Alaska.**—*Plant Dis. Reptr. Suppl.* 232, pp. 94-101, 1955. [Multilithed.]

Since the publication of the previous list of diseases of grasses and cereals in the western United States and Alaska [*R.A.M.*, 32, p. 680] the number of Alaskan records has increased sixfold [cf. 33, pp. 183, 607]. This revised host-fungus index, issued separately for Alaska, includes only parasitic fungi and some associated forms, and such early invaders of necrotic tissue as *Hendersonia crastophila*. Of special interest is the occurrence of *Puccinia coronata* on *Bromus arcticus* as the host is not included in either Anderson's Flora of Alaska or Hitchcock's Manual of the grasses of the United States.

Kreitlow (K. W.), Graham (J. H.), & Garber (R. J.). **Diseases of forage grasses and legumes in the Northeastern States.**—*Bull. Pa agric. Exp. Sta.* 573, 42 pp., 2 col. pl., 14 figs., 1953.

The chief diseases affecting lucerne, clovers, bird's foot trefoil [*Lotus corniculatus*],

and grasses in the north-eastern United States are described and illustrated, together with the most recent information on their control. There is a bibliography of 45 titles, a glossary of technical terms used in the text, and a host index.

Meiners (J. P.). **Etiology and control of snow mold of turf in the Pacific Northwest.**—*Phytopathology*, 45, 2, pp. 59–62, 2 figs., 1955.

Snow mould of turf in the Pacific Northwest is associated with *Calonectria graminicola* [*C. nivalis*], *Typhula itoana* [*R.A.M.*, 31, p. 330], or both. The latter species is severe only under a snow cover, whereas the former also develops during cool, moist periods in the autumn and spring. During tests at Spokane and Pullman, Washington, covering a period of three years, the maximum reduction in the incidence of infection was consistently effected by treatment with phenyl mercury formulations, comprising 10 per cent. PMAS, phenyl mercury acetate solubilized No. 10, puraturf GG, and 10 per cent. tact-c-lect [31, p. 331], followed in order of decreasing efficiency by calo-clor and cadminate [32, p. 134].

Joshi (N. C.). **Occurrence of Sphacelotheca mcalpineae Zundel on Heteropogon contortus L.**—*Curr. Sci.*, 24, 2, pp. 62–63, 1 fig., 1955.

Sphacelotheca mcalpineae was collected in the neighbourhood of Ajmer, India, from the inflorescence of *Heteropogon contortus* [a pasture grass] during October and November, 1954. The smut destroys the entire inflorescence.

Ylimäki (A.). **On the effectiveness of penta- and tetrachloronitrobenzenes on Clover rot (Sclerotinia trifoliorum Erikss.).**—*Acta agral. fenn.*, 83, pp. 147–158, 3 figs., 1955. [Finnish summary.]

A tabulated account is given of experiments carried out since 1945 at the Agricultural Research Centre, Tikkurila, Finland, on the chemical control of clover rot (*Sclerotinia trifoliorum*) [*R.A.M.*, 29, p. 621]. Satisfactory results were obtained by four applications between 15th September and 15th December of either brassicol or botrilex, both containing 20 per cent. pentachloronitrobenzene and 80 per cent. filler, the former supplied by Farbwerke Hoechst, Frankfurt, Germany, and the latter by Bayer Agriculture Ltd., London; they should be used at the rate of 50 to 70 kg. per ha. These treatments increased fresh weight yields by 5 to 31 per cent. The fungistatic action of the two compounds was also demonstrated in oat agar cultures of the pathogen. The tecnazene product folosan proved ineffectual against *S. trifoliorum*.

Rossiter (R. C.). **Strain reaction to potassium deficiency in Subterranean Clover (Trifolium subterraneum L.).**—*Aust. J. agric. Res.*, 6, 1, pp. 9–14, 1 pl., 1955.

In two pot culture and one field experiment at the Division of Plant Industry, Nedlands, Western Australia, the Dwalganup, Yarloop, Bacchus Marsh, Mt. Barker, and Tallarook strains of subterranean clover grown on Crawley sand at Perth were all similarly affected by potassium deficiency [*R.A.M.*, 32, p. 563], and no evidence of differential response to applied potassium was obtained. Leaf symptoms, including chlorosis, 'pitting', and marginal necrosis of older leaves, and marked reduction in size and mild, mosaic-like chlorosis of young ones, were essentially similar in all five strains. The development of these symptoms was determined by chronological age, not stage of growth. The data obtained indicated that the 'critical percentage' for potassium in the leaf plus petiole fraction of subterranean clover tops, irrespective of strain, was about 0·8, provided the plants were at least ten weeks old.

Straby (A. E.) & Macneill (B. H.). **A new seedling disease of Red Clover caused by Pythium ultimum Trow.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22, p. 18, 1954.

Poor seedling stands of red clover on sandy soil in Ontario were attributed to

Pythium ultimum [*R.A.M.*, 31, p. 386]. Infection occurred only between germination and the production of laterals by the radicle, and could take place within 12 hours of sowing. Affected seedlings collapsed rapidly, showing lesions on the cotyledons and browning of the radicle. A seed dressing of leytosan P was effective against *P. ultimum*.

Erwin (D. C.). **Crown and root rot of Alfalfa.**—*Calif. Agric.*, 9, 3, pp. 11–12, 4 figs., 1955.

The information in this article on the root rots of lucerne caused by *Phytophthora cryptogea* [*R.A.M.*, 34, p. 458] and *Stagonospora meliloti* [33, p. 730], and dark crown necrosis of undetermined origin [loc. cit.] has already been noticed from different sources.

Cralley (E. M.). **Wilt diseases—another Alfalfa problem.**—*Arkans. Fm Res.*, 2, 3, p. 6, 1953.

Lucerne in Arkansas is subject to severe attack by bacterial wilt (*Corynebacterium insidiosum*) [*R.A.M.*, 32, p. 564] and *Fusarium* wilt [32, p. 485]. The former seriously depletes the stands and may render the crop unprofitable for about three years. The use of resistant varieties such as Buffalo and Ranger [31, p. 387] offers the best means of control; Buffalo in particular is well adapted to Arkansas and should be grown wherever bacterial wilt is present. Until recently *Fusarium* was considered to be of minor importance. Experiments to secure resistant varieties are in progress. Greenhouse studies indicated that the disease is generally aggravated by high nitrogen and phosphorus levels and low potassium.

Peake (R. W.) & Cormack (M. W.). **Effect of bacterial wilt on hay yield of irrigated Alfalfa.**—*Canad. J. agric. Sci.*, 35, 2, pp. 202–210, 2 pl., 2 graphs, 1955.

A marked reduction in hay yield of Grimm lucerne, due to bacterial wilt [*Corynebacterium insidiosum*: *R.A.M.*, 34, p. 459], was observed after 1940 in the rotation plots at Lethbridge, Alberta, averaging 57·7 per cent. from the fourth to the sixth crop year as against 8·7 per cent. for the corresponding period before the establishment of the disease. The disease, which caused equivalent losses in fertilized and unfertilized fields, developed gradually during the first three crop years but increased rapidly thereafter. Hay yields of Grimm, Canauto, Ferax, and Rhizoma were greatly reduced after the third crop year and those of Ladak, Buffalo, Cossack, and Viking during the fifth and sixth year. The resistant Ranger and Hardistan remained high yielding.

In another experiment under conditions favourable to disease development the stand and yield of all the varieties except Hardistan, Orestan, and Wisconsin Synthetic C were seriously reduced. Winter injury added to the stand reductions in Buffalo and Ranger.

Savoia (H. J.) & Bruni (O.). **Podredumbre de la raíz de la Alfalfa.** [Root rot of Alfalfa.]—*Rev. Invest. agríc., B. Aires*, 7, 2, pp. 165–184, 7 figs., 1 map, 1953.

Root rot of lucerne is particularly troublesome in the vicinity of Pergamino, Argentina [cf. *R.A.M.*, 30, p. 614], and is believed to be responsible for the premature dying of the crop in that area. It has been found to be widespread, except in plantings only one or two years old, and has also been found at Junín, Buenos Aires province, and Ballesteros, Córdoba province. The causal organism is believed to be a basidiomycete and is new to the country and possibly new to science also. It is easily cultivated and has an optimum growth temperature of about 28° C. The initial symptoms are small, well-defined cankers which subsequently rot, involving the whole root. When the root rot is well advanced the plants wilt. There is generally a considerable period between initial infection and the death of

the plant owing to the constant formation of new roots to replace those rotted. In areas that are frequently cut or grazed severely affected plants may produce shoots sparsely or not at all and then their death is unnoticed. The new disease is a factor governing selection in the improvement programme.

Hashioka (Y.) & Suzuki (Y.). **Strains of Sclerotinia trifoliorum and certain cultural conditions relating to the severity of the Sclerotinia rot of Chinese Milk Vetch.** —*Res. Bull. Fac. Agric. Gifu Univ.*, 3, pp. 1–12, 2 pl., 6 graphs, 1 map, 1954. [Japanese summary.]

Much of the information in this paper dealing with the physiology and parasitism of *Sclerotinia trifoliorum* on *Astragalus sinicus* carried out at Hokuriku Agricultural Experiment Station has already been noticed [*R.A.M.*, 33, p. 300].

It is concluded that the greater severity of *S. trifoliorum* in north-western Japan as opposed to the drier Pacific side of the country is due to the damp, cold climate rather than to differences in the virulence of the pathogen or the susceptibility of the host.

Bessey (E. A.). **A new species of Camptomeris, and further notes on the genus.**— *Pap. Mich. Acad. Sci.*, 40, pp. 3–6, 2 pl., 1955.

Two lots of specimens of *Camptomeris astragali* n.sp. were collected by Prof. Hazime Yoshii on *Astragalus sinicus* in June, 1950 and 1952, in rice paddies at Kagoshima, Kyushu, Japan, where the host is grown for green-manuring purposes.

C. astragali differs from other species [cf. *R.A.M.*, 33, p. 323] in occurring on a member of the Fabaceae instead of the Mimosaceae, in the large number of conidiophores to a megalophysis, in the short, mostly unicellular, globoid or pyriform conidia, and in the frequent emergence of two megalophyses through the same stoma.

Roland (G.). **Le problème des viroses des arbres fruitiers.** [The problem of viroses of fruit trees.]—Reprinted from *Fruit belge, 1954*, 151, 5 pp., 2 figs., 1954.

The author states that little has been accomplished with regard to virus diseases of fruit trees in Belgium owing to lack of both staff and experimental areas. He outlines the characteristics of some common viruses on various parts of the tree, including those of peach mosaic [*R.A.M.*, 24, p. 491] and apple mosaic virus [7, p. 727], which are already known to occur in Belgium. The destruction of infected material and rigidly controlled importation of trees and scions are advocated.

Ciferri (R.), Rui (D.), & Scaramuzzi (G.). **Relazione sommaria su alcune malattie da virus e da carenza di alberi fruttiferi nell'Italia settentrionale.** [Brief report on some virus diseases and nutritional disorders of fruit trees in northern Italy.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, 38, 7–8, 3 pp., 1954. [English summary. Received 1955.]

The following diseases of fruit trees were among those observed by Dr. L. C. Cochran and G. Stout during a tour of the provinces of Liguria, Lombardy, and Veneto, Italy. The witches' broom virus was present on apple seedlings [*R.A.M.*, 32, p. 681] in the nursery of the Botanic Garden, Pavia University, and it is suggested that it belongs to the 'yellows' rather than the 'mosaic' group. The foliar symptoms of almond mosaic virus [27, p. 245] vary from the 'calico' type to line patterns. Fig mosaic was ubiquitous. In spite of the affected peach trees being in an advanced stage of the disease peach willow leaf rosette in Magliolo and Bardino Nuovo [31, p. 191] was identified as belonging to the 'stunt' group of viruses. In some cases the syndrome was ascribed to peach rosette. The symptoms of boron deficiency in olives [33, p. 363] correspond closely with those observed in California [23, p. 69], and although phloem necrosis has not yet been seen there it may

have been overlooked. The formation of witches' brooms may also be a symptom of this disorder. The results of preliminary experiments using similarly-based fertilizers have lent support to the theory that peach leptonecrosis [34, p. 731] and cherry decline [32, p. 259] have a similar etiology.

WRIGHT (T. R.) & SMITH (E.). **Relation of bruising and other factors to blue mold decay of Delicious Apples.**—*Circ. U.S. Dep. Agric.* 935, 15 pp., 1 graph, 1954.

The experiments carried out in Washington in 1947 and 1948 on the association between bruising and decay of apples by *Penicillium expansum* have already been noticed from another source [*R.A.M.*, 31, p. 243]. During 1949 a further series of investigations on Delicious apples showed that the susceptibility of bruises to decay decreased rapidly after three days' storage. The amount of infection increased with ripeness, which did not, however, affect the rate of enlargement of decaying areas. Rapid cooling and subsequent storage temperatures of 31° to 32° F. greatly retarded the development of decay in bruised tissue.

GOODMAN (R. N.). **Development of methods for use of antibiotics to control fireblight.**—*Res. Bull. Coll. Agric. Univ. Mo.* 540, 16 pp., 1954.

The information presented in this bulletin on the control of apple fireblight (*Erwinia amylovora*) in Missouri by terramycin, streptomycin, and thiolutin sprays has already been noticed from other sources [*R.A.M.*, 34, pp. 529, 601].

MCKEEN (W. E.). **Blossom and twig blight of Pear caused by Pseudomonas syringae.** —Abs. in *Proc. Canad. phytopath. Soc.*, 22, p. 15, 1954.

An epiphytotic of blossom and twig blight of pears in Vancouver Island during the spring of 1953 [the symptoms of which are described] was due to *Pseudomonas syringae* [cf. *R.A.M.*, 29, p. 468].

WORMALD (H.). **The brown rot diseases of fruit trees.**—*Tech. Bull. Minist. Agric., Lond.*, 3, vi+113 pp., 20 pl., 3 figs., 2 graphs, 3 maps, 1954. 5*s*.

This very comprehensive publication covers all aspects of the brown rot diseases caused by *Sclerotinia fructigena*, *S. laxa*, and *S. fructicola*, bringing up to date a previous bulletin [*R.A.M.*, 14, p. 367]. An account of the history and geographical distribution of the diseases, together with data on losses arising from them, is followed by sections dealing with the systematics of the fungi concerned, their morphology and cytology, the conditions and methods of entry into the host, and their culture, physiology, and biochemistry. Antagonism and antibiotic effects in relation to these fungi are discussed, together with the laboratory methods used in toxicity tests and the fungicidal treatments applied to combat them.

References to host plants are given; also detailed accounts of the fungi on their various cultivated hosts. The bulletin concludes with the general principles governing control of brown rot and a very extensive bibliography is appended.

DARPOUX (H.). **Les Monilia.** [The Monilia].—Reprinted from *Rev. Zool. agric.*, *1953*, 4–6, 9 pp., 1 diag., 1953.

A description is given of the symptoms, life history, and control of brown rot of apricot, peach, plum, and cherry, caused by *Sclerotinia fructigena* and *S. laxa* [*R.A.M.*, 33, p. 161 and cf. preceding abstract] in Europe, with particular reference to France. The control methods are based on those obtaining in the United States [33, p. 96].

HUTTON (K. E.) & LEIGH (D. S.). **Brown rot of stone fruits in New South Wales. I. Control investigations on coastal dessert Peaches.**—*Agric. Gaz. N.S.W.*, 66, 1, pp. 23–28, 3 figs., 1955.

Brown rot (*Sclerotinia fructicola*) [*R.A.M.*, 33, p. 412; 34, p. 46, and next abstract]

causes sporadic heavy losses to stone fruit in New South Wales. During two seasons (1952–54), investigations aimed at improving control on Shanghai seedling dessert peaches were conducted in an orchard at Dural. In both seasons a uniform application of copper oxychloride was given at bud swell.

In the first season wettable sulphur (0·22 per cent.) was compared with thiram (0·12 per cent.), with or without the addition of potassium fertilizer. The fungicides were applied six times between 11th September (early 'petal-fall') and 24th January and were intended to combat *Taphrina deformans* [33, p. 211], *Cladosporium* [*Fusicladium*] *carpophilum* [33, p. 240], and *Puccinia pruni-spinosae* [33, p. 211] as much as *S. fructicola*. Potassium chloride soil dressings (2 lb. per tree) were applied on 11th September and a 1 per cent. potassium chloride spray on 2nd January.

In the second season investigations were confined to comparisons between 0·29 per cent. wettable sulphur, 0·12 per cent. thiram, 0·1 per cent. captan, and 0·1 per cent. 9,10-phenanthraquinone, each being applied six times between 14th September and 20th January.

In the first season the average percentages of infected fruit were 2·9 for thiram and 6·1 for wettable sulphur. Differences between the fertilizer treatments were not significant. In the second season the percentages of brown rot were assessed at full maturity three days after a spray with a heavy suspension of *S. fructicola* spores, the percentages of infected fruit being 5·2 for captan, thiram 8·4, sulphur 24·4, and 9,10-phenanthraquinone 25·3. Captan caused a mild russet on the fruit. The higher cost of thiram may make it unprofitable to use except where heavy losses might occur.

Morschel (J. R. G.). **Brown rot of stone fruits in New South Wales. II. Some observations and trials on the Murrumbidgee Irrigation Area.**—*Agric. Gaz. N.S.W.*, 66, 3, pp. 146–150, 2 figs., 1955.

Conditions in the Murrumbidgee Irrigation Area normally do not favour brown rot (*Sclerotinia fructicola*) [see preceding abstract] of stone fruit, and losses, despite occasional widespread outbreaks, are low. During the past six years brown rot was studied at Yanco Experiment Farm with a view to finding protection against sudden outbreaks of the disease. Peaches were on the whole less affected than apricots.

In blossom blight inoculation experiments apricot flowers were sprayed with spore suspensions, and the laterals enclosed in plastic bags for seven to ten days. Flowers are most susceptible when one quarter to fully open. Infection at petal fall sometimes results in 'premature' brown rot 'mummies' in apricots and may be a link in the life cycle of the fungus. In the most severely affected orchards in the area natural infection ranged from nil to 18 per cent. with an average of 5·2 over the last five years.

After the 1948–9 outbreak attempts were made to sterilize large masses of 'mummies' *in situ*. Materials used included 2,4-D, copper oxychloride, sodium chlorate, and sodium dinitro-*o*-cresylate. The last seemed to be most effective, while sulphate of ammonia showed promise. Favourable conditions for continuing the experiment on a large scale have not since occurred.

Observations on the influence of the weather [cf. *R.A.M.*, 34, p. 232] suggest that heavy rainfall for several days, accompanied by high relative humidity, is not necessarily conducive to brown rot in the Murrumbidgee Irrigation Area if normal hot conditions return afterwards, but if humid weather accompanied by rain occurs when the fruit is mature, or approaching maturity, it is certain to induce an outbreak.

In trials [cf. 23, p. 166] over the past five years with trees which had previously received normal seasonal sprays against leaf curl [*Taphrina deformans*] and rust [*Puccinia pruni-spinosae*] no fungicide or formulation (applied in two pre-harvest

sprays) consistently reduced the low incidence of fruit brown rot present under local conditions.

Tomlinson (N.) & Woodbridge (C. G.). **Evaluation of a colorimetric and ultra-violet absorption test for diagnosis of plant virus diseases as applied to stone and small fruits.**—*Canad. J. agric. Sci.*, 35, 2, pp. 111–123, 1 diag., 1 graph, 1955.

In tests at the Canada Department of Agriculture, Summerland, British Columbia, for diagnosing and studying the fruit tree viruses occurring in British Columbia the method of Lindner *et al.* [*R.A.M.*, 31, p. 420] failed to distinguish virus-infected cherry trees, cucumber plants infected with a latent cherry virus, and virus-infected black raspberry and strawberry from healthy plants of the same species. It was, however, successful in the differentiation of healthy peach leaves from those infected with western X-disease [? strain of peach X-virus: cf. 34, pp. 232, 378] during a part of the growing season, but its specificity in this connexion is uncertain, the slow spread of the disease making adequate sampling for early virus detection very difficult.

The ultra-violet absorption spectra of test solutions indicative of healthy plants [31, p. 421] appear to be due principally to pentose nucleic acid hydrolysis products and the spectra of test solutions, indicative of virus infections, to polyphenols and pentose sugars.

Dye (D. W.). **Further report on blast of stone fruit.**—Reprinted from *Orchard. N.Z.*, 2 pp., March, 1954.

Stone fruit blast [*Pseudomonas syringae*: *R.A.M.*, 33, p. 35] was particularly severe in Central Otago, Hawke's Bay, and Auckland, New Zealand, during 1953–4. The known host range includes almond, apricot, cherry, nectarine, peach, and plum, and also lilac, willow [*Salix*], and poplar. The bacterium is most virulent in cold, wet weather, especially in succulent growth, but can only attack through a wound, or through leaf scars for a short time after leaf fall. No evidence has been obtained that the disease may be controlled by the application of a therapeutant [loc. cit.] once it has established itself on the host, but a prophylactic antibiotic spray of some promise is being tested.

Ciferri (R.) & Scaramuzzi (G.). **'La sharka' o 'vaiolatura ad anello' del Susino, grave malattia da virus in Iugoslavia.** ['Sharka' or ring pox of Plums, a serious virus disease in Yugoslavia.]—Reprinted from *Riv. Ortoflorofruttic. ital.*, 38, 9–10, 6 pp., 6 figs., 1954.

Plum pox or ring pox virus disease [*R.A.M.*, 34, p. 463] is characterized by ring mosaic on the leaves and marked ring patterns on the fruit in the tissue beneath the waxy layer, dark olive-green in unripe fruit and brown in mature samples, surrounded by a reddish border. The authors recapitulate the history, symptoms, host range, economic importance, and dissemination of this disease in view of its wide distribution in the Balkans and the danger of spread to other countries, such as Italy, and an increase in its present host range [33, p. 304].

Smith (L. C.) & Wishart (R. L.). **Minimizing tree losses from Apricot gummosis.**—*J. Dep. Agric. S. Aust.*, 58, 11, pp. 450–454, 9 figs., 1955.

A system of modified pruning, tested over two years, is recommended to reduce losses from apricot gummosis [associated with *Cytosporina* sp.] resulting from infection through wounds in South Australia [*R.A.M.*, 31, p. 497; 33, p. 96]. It has no harmful effect on fruit quality.

No cuts should be made on the main limbs. Laterals should be allowed to develop into subsidiary fruiting limbs and be pruned at a distance of 1 ft. or more from the main limb. Trees may be left unpruned for one year, and fruit thinned out; in the

second season the desired secondary limbs should be developed by cutting into two-year wood at a safe distance (depending on vigour and position) from the main limbs: in the third year they should be allowed to grow until about 2 ft. long. Another method involves retention and shortening back to 12 to 15 in. of laterals in the first year and continuation to 2 ft. in the second. Any new infections occurring on the cut laterals should be promptly eliminated.

Cane fruits.—*Bull. Minist. Agric., Lond.*, 156, 29 pp., 8 pl., 2 figs., 1955.

In this new bulletin on the cultivation of cane fruits, the section on diseases (pp. 28–29) contributed by the Plant Pathology Laboratory, Harpenden, Herts, includes notes on the symptoms and control of cane spot (*Elsinoe veneta*) [*R.A.M.*, 26, p. 160] on raspberries, loganberries, and, less commonly, blackberries; rust (*Phragmidium violaceum*) [cf. 34, p. 380] on blackberries; spur blight (*Didymella applanata*) [32, p. 262] on raspberries; raspberry mosaic virus [31, p. 192]; and [*Rubus*] stunt virus [loc. cit.].

Sakurai (Y.). **Pathologico-anatomical observations on the white root rot of Mulberry trees caused by Rosellinia necatrix (Hart.) Berl.**—*Res. Rep. Fac. Text. Seric. Shinshu Univ.*, 2, pp. 18–26, 5 figs., 1952. [Japanese, with English summary.]

In the laboratory of Phytopathology and Mycology, Shinshu University, Japan, observations on the mode of entry of *Rosellinia necatrix* into the roots of mulberry [cf. *R.A.M.*, 25, p. 17] demonstrated that the pathogen is able to break through the cork cell layer of young trees but enters older ones mainly by the lenticels. In the vascular tissues the host cells are disorganized in advance of the penetrating hyphae, which are able to break through the wound periderm formed round the initial lesion. The pith cells and the central wood tissue are not so readily destroyed by *R. necatrix*.

Beneke (E. S.), White (L. S.), & Fabian (F. W.). **The incidence and pectolytic activity of fungi isolated from Michigan Strawberry fruits.**—*Appl. Microbiol.*, 2, 5, pp. 253–258, 1 graph, 1954.

A total of 2,107 isolations were made from the surface and subsurface of green and ripe strawberry fruits grown near Benton Harbor, Michigan. The fungi found most commonly on the surface, listed in decreasing frequency of isolation, were *Hormodendron* sp., yeasts, *Rhizopus nigricans* [*R. stolonifer*], *Alternaria* sp., *Pullularia pullulans*, *Penicillium* sp., *Botrytis cinerea*, *Pezizella lythri*, *Aspergillus* sp., *Trichoderma* sp., and *Mucor* sp. The greatest amount of macroscopic degradation, consistently associated with a higher pectinase content in the affected fruit, was caused by inoculations of fresh strawberries with *B. cinerea*, *R. stolonifer*, and *Aspergillus* sp. It is noted that the mould count of a food product is not necessarily an indication of the amount of pectolytic breakdown.

Verona (O.). **Presenza di specie di Trichosporon in sanse di Oliva.** [The occurrence of species of *Trichosporon* in Olive husks.]—Reprinted from *Ann. Fac. Agr. Pisa*, N.S., 15, 4 pp., 1954.

An investigation in Italy of once-pressed olive husks obtained from Spain yielded isolates of *Trichosporon*-like yeasts, probably referable to a single species. They exhibited a certain lipolytic activity which, combined with the activity of other species and of the lipolytic enzymes usually present in the husks, produced the increase in acidity that induced the husks to become mouldy during the storage period preceding the second oil extraction.

Halma (F. F.) & White (F. A.). **Chlorosis in Avocado.**—*Calif. Agric.*, 7, 7, pp. 3, 14, 2 figs., 1953.

The relative susceptibility of avocado rootstocks to an undetermined chlorosis was studied in two experimental plots in California from 1949 to 1951. None of the 10 Guatemalan rootstock varieties was without symptoms and none of the trees on Mexican and West Indian stocks was affected.

Dorsey (C. K.) & Gallegly (M. E.). **A general-purpose garden pesticide.**—*Bull. W. Va agric. Exp. Sta.* 365 T, 25 pp., 1954.

During 1952–3 experiments were carried out at the West Virginia Agricultural Experiment Station on nine different vegetable crops to discover the best general purpose spray or dust for home gardens. The bulletin deals chiefly with pesticides but gives an eventual conclusion that a combination of zineb with methoxychlor plus malathion was the best, giving good control of tomato and potato early and late blights [*Alternaria solani* and *Phytophthora infestans*: *R.A.M.*, 33, pp. 55, 73] and cucumber anthracnose [*Colletotrichum lagenarium*: 32, p. 59]. The spray was mixed at 2–2–2½ lb. per 100 gals. and the dust 3·9–5–4 per cent. with pyrophillite as a diluent.

Adams (R. E.), Terry (C. W.), Parker (K. G.), Brown (L. R.), & Dewey (J. E.). **A flexible-outlet mist sprayer.**—*Bull. Cornell agric. Exp. Sta.* 904, 15 pp., 6 figs., 1954.

An orchard sprayer, designed for the fruit grower with a small acreage and suitable for dilute sprays or as a mist concentrate sprayer, is described. A 100- or 200-gal. tank holds the spray mixture, there is a blower consisting of a pressure-type radial flow fan, and a high pressure plunger type pump atomizes the spray, ensuring an air discharge of at least 5,000 cu. ft. per minute at 90 to 110 m.p.h. The air outlet is worked by an operator and manipulated to give good coverage and the machine is drawn by a small tractor.

Edwards (C. J.) & Ripper (W. E.). **Droplet size, rates of application and the avoidance of spray drift.**—*Proc. Brit. Weed Control Conf., 1953*, pp. 348–367, 2 figs., 3 graphs, [? 1954].

Useful information on the technique of low volume spraying with particular reference to hormone weedkillers is given in this paper, much of which is interesting to plant pathologists. The principle and methods underlying spray droplet formation are discussed, together with various means of measuring spray pattern. Droplet size and retention are dealt with, and rates of application. The problem of spray drift is covered in some detail, with special reference to its medical aspects.

Anchel (Marjorie), Hervey (Annette), & Robbins (W. J.). **Biological activity of p-methoxy-tetrachlorophenol.**—*Mycologia*, 47, 1, pp. 30–33, 1955.

In work conducted at New York Botanical Garden and in the Department of Botany, Columbia University, New York, the antibiotic activity of *p*-methoxy-tetrachlorophenol (drosophilin A) [*R.A.M.*, 31, p. 622] was compared with that of related phenols and quinones. Against ten species of fungi this chemical was at least as toxic as phygon or spergon, though rather less so than pentachlorophenol. The results varied somewhat with the test organism used. According to Dr. G. W. McNew, it was as effective as spergon but less effective than phygon in killing spores of *Sclerotinia fructicola* and *Alternaria oleracea* [*A. brassicicola*].

It is concluded that this compound compares favourably as an anti-fungal agent with spergon and phygon. Of related phenols and quinones, only pentachlorophenol displayed a higher potency. The results suggest that further investigation of its effects on fungi parasitic on animals might be desirable.

Wallace (G. B.) & Wallace (Maud M.). **Index to references to plant diseases in laboratory publications.**—*Mycol. Circ. Dep. Agric. Tanganyika* 35, 15 pp., 1954.

This index issued by the Plant Pathology Laboratory, Lyamungu, Moshi, Tanganyika, covers papers issued up to May, 1954, some of which are out of print. Most of them have been noticed from time to time in this *Review*.

Making and using lime sulphur.—*Agric. Gaz. N.S.W.*, 66, 2, pp. 97–98, 101, 1955.

This article gives in simple terms information on making lime-sulphur, including the preparation of a stock solution, dilution tables, and the reasons for airtight storage. Baumé readings have been abandoned as inaccurate and the recommended dilutions are based on the polysulphide sulphur content.

Alfaro (A.). **Los productos orgánicos de síntesis en la defensa de las plantas cultivadas.** [Synthetic organic products in the protection of cultivated plants.] —Reprinted from *Bol. Asoc. nac. Ing. agron., 1954*, 48, 12 pp., 1954.

The author sets out in tabular form the chemical name and formula, technical name or abbreviation, and properties and method of application of 60 synthetic organic fungicides commonly used in plant pathology.

Pflanzenschutz durch Kulturmaßnahmen. [Plant protection by cultural practices.] —*Pflanzenarzt*, 8, Spec. No. 3, 10 pp., 1955.

This number is devoted to a popular survey of plant protection through cultural practices, each article in turn discussing the problems of variety selection, fertilizing, crop rotation, timing of sowing and harvesting, plot situation, spacing of stands or plants, soil cultivation, and irrigation and draining, as they affect particular crops and their most common diseases.

F. Pichler deals with cereals. H. Wenzl, on root crops in general, mentions the advantages of concentration rather than dispersal of a crop to reduce infection from neighbouring fields, with particular reference to sugar beet yellows virus and potato viruses, and the dangers of using contaminated stable manure, and, in a special article on potatoes, discusses the timing of haulm-pulling. R. Fischer, on horticulture, deals with problems connected with grafting, transplanting, wound-dressing, roguing, and water-tables.

Chowdhury (S.) & Majid (S.). **Hand book of plant protection.**—vi+117 pp., 24 pl. (10 col.), Department of Agriculture, Assam, 1954.

This publication is designed to enable agriculturists to diagnose and control the pests and diseases attacking their crops in Assam. The section on plant diseases (pp. 2–40) includes a list of the major diseases of economic crops followed by notes on their symptoms and control. Fungicides and spraying equipment are discussed in the last section (pp. 105–114).

Baldacci (E.) & Fogliani (G.). **La valutazione del materiale biologico e abiologico dell'atmosfera. I Descrizione di un apparecchio per la captazione delle spore, polline, ecc. II Caratteristiche d'impiego in campo e in centri urbani.** [The evaluation of biological and non-biological material in the air. I Description of an apparatus for capturing spores, pollen, etc. II Principles for its use in the field and in urban districts.]—*Boll. Soc. ital. Biol. sper.*, 29, 5, pp. 982–983, 984–985, 2 pl., 1953. [Received 1955.]

At the Plant Pathology Institute, Milan University, an apparatus consisting of an electric aspirator-centrifuge, two phosphor-bronze filters of a mesh of 10,000 and 16,000 holes per sq. cm., and a brass tube through which aspirated air is drawn to a narrow orifice 37 mm. long and 0·05 mm. wide, beneath which are placed vaselined slides, was devised for capturing spores and other particles in the air [*R.A.M.*, 34, p. 664]. The rectangular depression chamber in reinforced brass

measures (internally) 33 cm. high, 64 cm. wide, and 65 cm. deep, and the whole apparatus stands on tubular steel legs, has a small roof, and can be adjusted to various heights.

The apparatus was designed for studying cereal rusts [*Puccinia* spp.] and powdery mildew [*Uncinula necator*] and downy mildew (*Peronospora*) [*Plasmopara viticola*] of the vine, but may also be used for other common pathogens. When installed in the field hourly samplings give notice of incipient epidemics and the need for spray applications.

Pinto-Lopes (J.) & Ré (L.). **Mycological abstracts (covering the whole Portuguese mycological literature).**—16 pp., Departamento de Micologia, Instituto Botânico, Faculdade de Ciências, Lisboa, 1953.

Part II of this publication (pp. 11–16) contains English summaries, by the first author, of 14 contributions to Portuguese mycological literature published during 1953.

Wolf (F. A.). **An interpretation : sexuality of fungi.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 269–288, 3 figs., 1 diag., 1954.

In this paper an attempt is made to clarify the confusion existing in the interpretation of sexuality in fungi. It is suggested that all fungi may be fundamentally alike as regards sexuality, examples being cited from the literature (43 titles). There is evidence indicating that 'female' or 'male' isolates are hermaphroditic rather than unisexual, sex differences between gametes or their equivalents being due to a gradient of imbalance between the maleness (—) and femaleness (+) factor or factors. This imbalance may be induced by sex-differentiating hormones resulting in sex determination.

Vasil'kov (B. P.). Изучение шляпочных грибов в СССР. [The study of cap fungi in the U.S.S.R.]—191 pp., 14 pl., 7 figs., U.S.S.R. Academy of Sciences, Moscow–Leningrad, 1953. Roubles 10.

In this book, intended primarily for beginners and would-be botanists specializing in cap fungi, an attempt is made to trace the history of the study of the larger fungi in the U.S.S.R. from the earliest times (as far as possible) to the end of 1952 and work done abroad on Russian species. It is hoped that the book will serve as a useful reference and a guide to the existing literature (1,300 titles).

Pady (S. M.) & Kapica (L.). **Fungi in air over the Atlantic Ocean.**—*Mycologia*, 47, 1, pp. 34–50, 4 graphs, 1955.

Further information is presented on the numbers and kinds of fungi trapped during two flights made in 1951 from Montreal, Canada, to London, England [*R.A.M.*, 33, p. 743; cf. 34, p. 165]. Eighteen additional genera are reported. *Cladosporium* in polar air ranged from 0·01 to 0·1 per cu. ft. with the McGill-GE sampler (using nutrient plates) and 0·14 to 2·4 with the Bourdillon slit sampler (plates and silicone slides); in tropical air numbers reached 7·8 per cu. ft. in one air mass over the western Atlantic [cf. 32, p. 494]. *Cladosporium* colonies totalled 4,108, or 82·3 per cent. of all samples. *C. herbarum* was the commonest species, while *C. cladosporioides* and *C. macrocarpum* were found occasionally. The remaining genera were less than 1 per cu. ft.

The silicone slides exposed in the slit sampler showed the number of fungal spores as ranging from 0·2 per cu. ft. in polar air to 529 per cu. ft. in modified tropical air; *Cladosporium* spores were the most abundant, the concentrations rising to 9 per cu. ft. Excepting smuts, the same fungi were found on the slides and on the plates. Chlamydospores of the *Ustilago* type were present on all but seven slides and reached 4·5 per cu. ft. in tropical air near Iceland.

The evidence obtained indicated no gradual diminution in the concentration of fungi as the distance from land increased; it showed, however, that numbers in the air are correlated with air masses, and that fungi can cross the Atlantic from west to east.

McIlroy (I. C.). **A sensitive temperature and humidity probe.**—*Aust. J. agric. Res.*, 6, 1, pp. 196–199, 1 pl., 1 diag., 1955.

A description is given of a new instrument for the measurement of wet- and dry-bulb temperatures now in use at several Australian agricultural research stations for microclimatic studies. The dry-bulb element is a miniature platinum resistance thermometer consisting of an inch or so of 0·0005 in. bare platinum wire. The wet-bulb element is either a length of Wollaston wire with the outer silver removed over $\frac{3}{16}$ in., the whole surrounded by fine, parallel glass fibres, forming the wick, enclosed in a U-tube acting as a water reservoir, or cotton-covered platinum wire wound round the wick. The whole is mounted on a long plastic tube carrying the leads. It is specially suitable for use in confined spaces, e.g., within a crop or the foliage of a tree, or in still air, e.g., inside a building or a container.

A discussion on the maintenance of cultures by freeze drying.—ii+48 pp., 1 pl., British Commonwealth of Nations Scientific Liaison Offices, London. H.M. Stationery Office, 1954. 5*s*.

In this booklet are collected the papers and relevant discussions from a meeting of the permanent committee of the British Commonwealth Collections of Micro-organisms held in London in September, 1953, to consider the maintenance of cultures of bacteria and fungi by freeze-drying. The subjects discussed included the material to be dried, the effects of the drying process and suspending fluid on viability, the survival of dried organisms, conditions of storage, and the measurement and effect on viability of the moisture content of dried cultures.

Mielke (J. L.). **Refrigerator storage prolongs aeciospore color and viability.**—*Mycologia*, 47, 1, p. 149, 1955.

Excellent results in preserving the natural colour for two years or more and prolonging the viability of fresh, mature aecidiospores of species of *Cronartium* and *Peridermium* were obtained by placing the specimens in paper bags or wrappers and storing them in a refrigerator (5° to 7° C.).

Mardon (J.) & Pedder (D.). **Use of a soluble mercurial in slime control.**—Reprinted from *Pulp Pap.* (*Mag.*) *Can.*, 54, 10, 3 pp., 1953.

In this further contribution [cf. *R.A.M.*, 32, p. 141] the use of ethoxyethyl mercury acetate as an alternative to phenyl mercury acetate [loc. cit.] for slime control in a Lancashire paper mill is described. It is more soluble than the latter, but loses its biological activity more rapidly. It is a more effective bactericide and, though less fungicidal, has fungistatic properties. A 'crash' dose of $7\frac{1}{2}$ oz. remained active for two hours, 3 oz. only for an hour. Its use alternately with phenyl mercury acetate rather than the latter alone is recommended.

Sorbic acid as a fungistatic agent for foods. I–VII.—Reprinted from *Food Res.*, 19, 1, 65 pp., 1954.

In paper VI of this symposium the metabolic degradation of sorbic acid in cheese by moulds and the mechanism of mould inhibition are reviewed and experimental investigations are presented by D. Melnick, F. H. Luckmann, and C. M. Gooding (pp. 44–58), working at the research laboratories of The Best Foods, Inc., Bayonne, New Jersey. The fungistatic property of sorbic acid [*R.A.M.*, 30, p. 59] is attributed to the ability of β-unsaturated fatty acids of this nature to inhibit the dehydro-

genase enzyme system in moulds, thus exhibiting fungistatic and sometimes even fungicidal activity.

D. P. Smith and N. J. Rollin discuss in paper VII (pp. 59–65) the effectiveness of sorbic acid in protecting cheese [see following abstracts], giving the results of mould inhibition tests. The use of moisture-proof wrappers for cheese provides ideal conditions for mould growth, which is effectively inhibited by 2·5 to 5 gm. sorbic acid per 1,000 sq. in. cellophane on small packets.

Smith (D. P.) & Rollin (J. N.) [N. J.]. **Sorbic acid as a mold inhibitor.**—Reprinted from *Mod. Packag.*, **26**, 4 pp., 2 figs., 1 graph, 1953.

The substance of this paper has already been noted from another source [see preceding abstract].

Smith (D. P.) & Rollin (N. J.) **Sorbic acid as a fungistatic agent for foods. VIII. Need and efficacy in protecting packaged cheese.**—*Food Technol.*, 8, 3, pp. 133–135, 1954.

The authors estimate that a possible wastage of 13,000,000 lb. of cheese per year in the United States could be saved by the use of a fungistatic agent to prevent spoilage in store. Extensive laboratory tests at Milprint, Inc., Milwaukee, Wisconsin, have shown that sorbic acid, harmless to man, is suitable as a mould inhibitor when incorporated in cheese wrappers [see preceding abstracts and *R.A.M.*, 34, p. 665].

Streptomycin in agriculture. An annotated bibliography.—30+3 [unnumbered] pp., Glaxo Laboratories Ltd., Stoke Poges, 1955. [Mimeographed.]

In this information pamphlet, compiled by the Fermentation Research Division of Glaxo Laboratories Ltd., Stoke Poges, Bucks., 148 recent references (with abstracts) to papers on the uses of streptomycin in agriculture are included, many of which have been noticed in this *Review*.

Grossbard (Erna). **Stimulation of pigmentation and sporulation in fungi by metabolites of actinomycetes.**—Abs. in *J. gen. Microbiol.*, 12, 1, p. vi, 1955.

In antifungal paper disk assays of metabolites of various actinomycetes [*R.A.M.*, 34, p. 238], pigmentation of the medium was intensified in certain strains of *Verticillium dahliae* and *Helminthosporium victoriae*. Antibiotic metabolites of four species of *Streptomyces* caused *Fusarium oxysporum* f. *lycopersici* to produce a pigment (probably lycopersicin), and they accelerated maturity and increased stromatal density in *Colletotrichum atramentarium*. Other metabolites promoted sporulation in *Ceratostomella ulmi* and *Streptomyces* [*Actinomyces*] *scabies*. The stimulatory effect disappeared when the antibiotic was removed by adsorption or used below threshold concentrations and therefore may be regarded as a response to the adverse conditions leading to growth inhibition.

Rangaswamy (G.). **Use of antibiotics in plant disease control—a review.**—*Madras agric. J.*, **41**, pp. 1–6, 1954.

Recent achievements in the use of antibiotics to control plant diseases [*R.A.M.*, 34, p. 49 and next abstract] are discussed with a view to their potentialities for use on a larger scale in the future. Thirty references are appended.

Leben (C.) & Keitt (G. W.). **Antibiotics and plant disease.**—*J. agric. Food Chem.*, **2**, 5, pp. 234–239, 1954.

In this brief, semi-popular review of 84 items of the literature, the authors outline current investigations on the uses of antibiotics in the control of plant diseases [see preceding abstract] both as systemic and non-systemic fungicides.

Stokes (Anne). **Uptake and translocation of griseofulvin by Wheat seedlings.**—*Plant & Soil*, 5, 2, pp. 132–142, 1954.

In work at the Butterwick Research Laboratories, Welwyn, with wheat plants in nutrient solutions, the concentration of griseofulvin [*R.A.M.*, 32, p. 492] in guttation drops was used as a measure of its uptake and translocation. Griseofulvin was found to be phytotoxic at concentrations above 5 μg. per ml. and tended to accumulate in the leaves. Uptake and translocation were related to the transpiration rate and were checked by respiratory enzyme inhibitors in the medium.

Harley (J. L.) & Brierley (J. K.). **The uptake of phosphate by excised mycorrhizal roots of the Beech. VII. Active transport of ^{32}P from fungus to host during uptake of phosphate from solution.**—*New Phytol.*, 54, 3, pp. 296–301, 1 graph, 1955.

In further studies in this series at the Department of Botany, University of Oxford, the rate of active transport of labelled phosphorus (P^{32}) from fungus to host in excised mycorrhizal beech roots [*R.A.M.*, 33, p. 494] was reduced when the roots were washed in a buffer solution containing phosphate, but was resumed rapidly on their return to a phosphate-free buffer.

It is suggested that the phosphate absorbed from the external solution competes successfully for a substance produced in respiratory metabolism so that phosphate accumulated in the sheath is not mobilized. In the absence of an external phosphate supply the phosphate already accumulated in the sheath is utilized. Phosphorus moves into the core mainly from the external solution when this contains phosphate, otherwise from the phosphate in the sheath.

Feliciani (A.) & Montefiori (R.). **Allevamento in vivaio di Pseudotsuga douglasi e colonizzazione micorrizica delle piante.** [Raising *Pseudotsuga douglasi* in nurseries and mycorrhizal colonization of the seedlings.]—Reprinted from *Monti e Boschi*, 5, 3 pp., 4 figs., 1954. [French and English summaries.]

An examination of seedlings of *Pseudotsuga douglasi* [*P. taxifolia*], some of which made poor growth in the nursery and in plantations in Sondrio Province, northern Italy, revealed that mycorrhizal fungi [*R.A.M.*, 34, p. 311], favoured by the environmental conditions in which the seedlings were raised, frequently became actively parasitic and damaged the plants.

Hacskaylo (E.) & Palmer (J. G.). **Hymenomycetous species forming mycorrhizae with Pinus virginiana.**—*Mycologia*, 47, 1, pp. 145–147, 1 fig., 1955.

At the George Washington University, Washington, *Pinus virginiana* seedlings were grown for one month in terra-lite moistened with a nutrient solution without glucose [*R.A.M.*, 33, p. 370] and then inoculated with mycelial suspensions of American and Swedish hymenomycetes in a 0·25 or 0·5 per cent. glucose solution. All the American isolates (*Amanita caesaria*, *A. frostiana*, *A. rubescens*, and *Boletus bicolor*) formed mycorrhiza, while of those known to be mycorrhizal on *P. sylvestris* in Sweden, only *B. variegatus* and *Rhizopogon roseolus* did so. The American isolate *A. rubescens* formed mycorrhiza with short roots of *P. virginiana* produced when certain concentrations of β-indole-acetic acid were introduced into terra-lite cultures, and in this manner isolates of hymenomycetes might be used to increase the absorbing surface of tree seedlings before transfer to plantations.

Levisohn (Ida). **Isolation of ectotrophic mycorrhizal mycelia from rhizomorphs present in soil.**—*Nature, Lond.*, 176, 4480, p. 519, 1 fig., 1955.

In the course of researches on soil fungi at Bedford College, London, mycelia known to form ectotrophic mycorrhiza were isolated by washing fresh soil rhizomorphs for about ten seconds in 0·1 per cent. hydrochloric acid, rinsing in sterile

water, and plating on nutrient media [*R.A.M.*, 34, p. 546]. This procedure yielded *Boletus bovinus*, *B. scaber*, and *Mycelium radicis nigrostrigosum* from field soil and from experimental soil cultures grown in the laboratory. So far these fungi have resisted isolation from individual hyphae.

Tatarenko (E.). Влияние света на развитие плесневых грибов. [The influence of light on the development of mould fungi.]—Микробиология [*Microbiology, Moscow*], 23, 1, pp. 29–33, 1954.

Studies at the Ukrainian Scientific Research Institute of Food Production, U.S.S.R., showed that intense light inhibits ascus development in cultures of *Aspergillus nidulans*, *A. repens*, *A. amstelodami*, *A. chevalieri*, and *Penicillium ucrainicum* and retards sclerotial formation in *A. carbonarius*, *A. alliaceus*, *A. candidus*, *A. flavus*, and *A. thomi*. Weak light, on the other hand, stimulates conidial formation. Darkness increases mycelial growth, but after prolonged cultivation in the dark these fungi lose their ability to form conidia, and sterile or degenerate forms occur. In partially degenerate cultures conidial formation can be increased by cultivation in weak light and the effect is transmitted.

Blue light depresses mycelial growth and the development of asci and sclerotia, and does not allow the formation of red, orange, and yellow pigment in *Penicillium rubrum*, *A. amylovorus*, and *P. purpurogenum*, while stimulating conidial formation. Red light does not have the same depressing effect but fails to ensure pigmentation.

Johnson (T. W.) & Halpin (J. E.). **Environmental effects on conidial variation in some Fungi Imperfecti.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 314–326, 11 figs., 14 graphs, 1954.

A brief account of this work has already been noticed [*R.A.M.*, 32, p. 206]. Five-week-old, single spore cultures of *Alternaria solani*, *Curvularia lunata*, *Helminthosporium sativum*, *H. teres*, *Piricularia oryzae*, *Fusarium moniliforme* [*Gibberella fujikuroi*], and *Cercospora* sp. were subjected to incandescent or fluorescent light (50 to 2,100 foot-candles) at the Chemical Corps Biological Laboratories, Camp Detrick, Maryland. The treatment had no influence on conidial production of *G. fujikuroi* and *Cercospora* sp. or on a non-sporulating strain of *H. teres*. In the others it markedly increased the numbers of conidia in colonies kept at 10, 25, 50, and 95 per cent. relative humidity at 200 and 500 foot-candle intensities and in those on flood-seeded plates containing $\frac{1}{2}$, 1, 5, 10 and 20 per cent. total nutrient concentrations. The nature of the culture medium was the predominating influence, but the depth of the medium was without effect. There were fewer conidia on plates from single spores or plugs of mycelium than on those flood-seeded, but illumination had the same effect on both. Sporulating differences between strains were maintained under illumination.

The age of the culture was an important factor, six- and eight-week-old cultures producing considerably more conidia under illumination (200 foot-candles) than two- and four-week-old ones.

Temperature acts by increasing or decreasing the amount of growth and hence the number of conidia, but increased sporulation under illumination at 26° C. and 31° was about the same. Increasing illumination to 1,500 foot-candles without raising the temperature stimulated sporulation, but maximum production was usually at 500 foot-candles. At a constant temperature of 18° C. sporulation was low. At this temperature all the strains tested except *Curvularia lunata* showed an increase in conidial production under illumination, which reached its peak at 200 foot-candles.

The results of the influence of light quality were indeterminate.

Démétriadès (S. D.) & Papaïoannou (A. J.). **Études sur la biologie du Sclerotinia sclerotiorum (Lib.) Massee. V. La formation des apothécies sous les conditions**

de l'Attique (Grèce). [Studies on the biology of *Sclerotinia sclerotiorum* (Lib.) Massee. V. The formation of apothecia under the conditions in Attica (Greece).] —*Ann. Inst. phytopath. Benaki*, 7, 2, pp. 95–111, 1 pl., 2 diags., 1 chart, 1953.

Further studies in this series [cf. *R.A.M.*, 34, p. 101] showed that sclerotia of *Sclerotinia sclerotiorum* form apothecia even after a long resting period or exposure to cold. In Attica apothecia do not develop in the field or in the laboratory from June to September. They develop in May in the laboratory but not generally in the field owing to insufficient humidity, and their absence from the field in the following months is due to high temperatures. Apothecial formation ceases at temperatures above 23° C. and below 9·3°. Ascospores are therefore produced from October to April, inclusive, or even into May under particularly wet or humid conditions. Apothecia may develop from buried or surface sclerotia; their age (up to three years) does not affect apothecial germination, except within very wide limits. The sclerotia remain viable for long periods except in conditions of constant humidity, but submerged in sterile water viability is at least eight months. They are attacked and destroyed by *Trichothecium roseum* and a *Stachybotrys* sp., the latter being particularly active.

Barnett (H. L.) & Lilly (V. G.). **The effects of humidity, temperature and carbon dioxide on sporulation of Choanephora cucurbitarum.**—*Mycologia*, 47, 1, pp. 26–29, 1955.

In further studies at West Virginia Agricultural Experiment Station it was found that an accumulation of carbon dioxide in closed culture vessels reduced or prevented sporulation of *Choanephora cucurbitarum* [*R.A.M.*, 29, p. 424]. Both temperature and relative humidity were active in determining the numbers of conidial heads and sporangia formed, and the predominance of these was governed largely by relative humidity, the effect of which was increased at temperatures over 25° C. A relative humidity approaching 100 per cent. favoured the production of sporangia, whereas low humidity favoured the formation of conidial heads. These and previous studies demonstrate that the asexual sporulation of *C. cucurbitarum* is strongly affected by environment, indicating a high degree of adaptation of the fungus to its mode of life.

Day (W. C.), Gottlieb (S.), & Pelczar (M. J.). **The biological degradation of lignin. IV. The inability of Polyporus versicolor to metabolize sodium lignosulfonate.**—*Appl. Microbiol.*, 1, 2, pp. 78–81, 1 graph, 1953.

Further studies in this series at the University of Maryland [cf. *R.A.M.*, 30, p. 296] showed that although *Polyporus* [*Polystictus*] *versicolor* does not utilize sodium lignosulphonate as the sole source of carbon, this substance was removed from a nutrient solution by the fungus, and that glucose enhanced the disappearance of lignosulphonate in the presence of viable cells.

Peterson (E. A.) & Katznelson (H.). **Studies on the nutrition of Helminthosporium sativum and certain related species.**—*Canad. J. Microbiol.*, 1, 3, pp. 190–197, 1954.

In cultural studies in the Bacteriology Division, Department of Agriculture, Ottawa, Canada, the growth of *Helminthosporium sativum* [*R.A.M.*, 34, p. 23] was moderate in a medium containing nitrate, ammonium, or amino nitrogen, and greatly improved by the addition of yeast extract, fresh or ashed. Growth was also stimulated by a mixture of trace elements but not by eight vitamins. Some amino acids, including L-proline and DL-serine, were more favourable for utilization in the presence of trace elements. Zinc appeared to be essential for the growth of *H. sativum* and possibly also boron, iron, and manganese. The related species

H. biforme, *H. halodes*, *H. setariae*, *H. siccans*, and *H. victoriae* were also stimulated by trace elements.

Lindsay (W. L.) & Thorne (D. W.). **Bicarbonate ion and oxygen level as related to chlorosis.**—*Soil Sci.*, 77, 4, pp. 271–279, 2 graphs, 1954.

In water culture experiments at Utah State Agricultural College with Great Northern beans [*Phaseolus vulgaris*] an increased concentration of bicarbonate ions reduced the movement of radio-iron into the leaves and stems and accentuated its accumulation in the roots. In these cultures high levels of oxygen increased chlorosis. Iron sequestrene [*R.A.M.*, 33, p. 318] was only slightly better utilized by the plants at pH 7·8 than was soluble iron phosphate. It is concluded that chlorosis associated with poor aeration is not primarily due to reduced oxygen at the roots, but the increase in carbon dioxide raises the bicarbonate level, thus contributing to chlorosis by reduction of iron movement.

Maramorosch (K.). **Seedlings of Solanum tuberosum L. as indicator plants for Potato leafroll virus.**—*Amer. Potato J.*, 32, 2, pp. 49–50, 1 fig., 1955.

Seedlings of the potato variety Earlaine were tested as indicator plants for potato leaf roll virus [see next abstract] at the Laboratories of the Rockefeller Institute for Medical Research, New York. Infective aphids (*Myzus persicae*) were confined in celluloid cages on seedlings about 3 in. high for one week. The first symptoms, consisting of rolled leaves and stunting, appeared in four days.

Davidson (T. R.) & Sanford (G. B.). **Expression of leaf-roll phloem necrosis in Potato tubers.**—*Canad. J. agric. Sci.*, 35, 1, pp. 42–47, 1 graph, 1955.

Field studies were carried out over a period of four years at the Laboratory of Plant Pathology, Edmonton, Alberta, on the development of phloem necrosis in potato tubers with leaf roll virus [*R.A.M.*, 33, p. 749; cf. 34, p. 54, and preceding abstract] in relation to the infection period of the growing plant, using the susceptible Carter's Early Favourite and Netted Gem graft-inoculated at 10-day intervals beginning with very young plants. The results, based mainly on the percentages of the inoculated plants producing affected tubers and affected tubers per plant and partly on the amount of necrosis in the tubers, showed that incidence was very low with early inoculations, gradually increasing for those in July, and reaching its peak (100 per cent.) in plants inoculated in mid-August when tuber growth was most rapid.

Davidson (T. R.). **Rate of development of Potato leafroll vine symptoms.**—*Canad. J. agric. Sci.*, 35, 1, pp. 48–50, 1955.

In a greenhouse experiment, with temperature about 68° F., at the Plant Pathology Laboratory, Edmonton, Alberta, potato leaf roll virus infection [see preceding and following abstracts], as indicated by foliage symptoms, was successfully transferred by *Myzus persicae* to 85 per cent. of young Carter's Early Favourite potato plants in 15 to 17 days and to 100 per cent. in 18. The five-day delay in symptom development after stem graft inoculation, which was equally effective, was probably due to the relatively slow union of the severed phloem elements of test plants.

Locke (S. B.). **Vector feeding relative to leafroll resistance in Potato varieties.**—Abs. in *Amer. Potato J.*, 31, 11, p. 370, 1954.

Counts of aphids [unspecified] on potato plants during five seasons at Pullman, Washington, showed no correlation with the amount of leaf roll [virus] infection [see following abstracts] in any given variety [cf. *R.A.M.*, 33, p. 442]. In cage experiments confining equal numbers of aphids to small leaf areas there were highly

significant differences in the amount of feeding injury, which was small in one resistant and two susceptible varieties, and considerable in two other resistant ones. These results indicate the existence of two types of field resistance, one associated with sensitivity to aphid feeding.

Henner (J.). **Vergleichende Untersuchungen über den hydroponischen und erdgebundenen Kartoffel-Augenstecklingstest.** [Comparative studies on the hydroponic and the soil-culture Potato-eye-cutting test.]—*PflSchBer.*, 14, 7–9, pp. 97–118, 11 figs., 1955. [English summary.]

In comparative tests made at the Federal Institute for Plant Protection, Vienna, potato eye cuttings grown in hydroponic culture [*R.A.M.*, 33, p. 313] were throughout superior in shoot development to those in soil. Streak [? virus Y: 31, p. 535] symptoms were more pronounced in the hydroponic culture, leaf roll [loc. cit.] on soil-grown plants, while mild mosaic [loc. cit.] and crinkle [X+A: cf. 32, p. 611] were of equal intensity in both cultures. All symptoms, however, could be observed four to 12 days earlier in the hydroponic cultures than in the soil.

Under-developed roots usually indicated the presence of virus Y or leaf roll [32, p. 33]; mixed infections caused marked root weakness. Mild mosaic and crinkle did not affect the roots, and had to be diagnosed from the shoots. Tests confirmed the localization of virus Y in primarily infected tubers [cf. 33, p. 108].

Baerecke (Marie-Luise). **Versuche zur Isolierung von Stämmen des Blattrollvirus.** [Experiments on the isolation of strains of leaf roll virus.]—*Züchter*, 25, 3, pp. 67–79, 10 figs., 1955.

In further attempts at the Max Planck Institute for Breeding Research, Voldagsen, Western Germany, to differentiate strains within the potato leaf roll virus, 92 isolates were tested by transmission to *Physalis floridana* [*R.A.M.*, 30, p. 64], and 27 potato varieties. They fell into four groups on the basis of the more or less severe symptoms induced on Bona and Mittelfrühe. Two strains or strain mixtures in Bona remained constant for over four years in the progeny and in transmission tests, whereas those of a third group segregated into various types. The results of premunity tests on Bona showed that young field plants grown from inoculated (pregerminated) tubers were protected against secondary infection.

Obregon (G.). **'Enrollamiento de los hojas' en la Papa. Grave enfermedad virosa para los cultivos en Colombia.** [Leaf roll of Potato. A serious virus disease of the crop in Colombia.]—*Agricultura trop.*, 10, 3, pp. 29–31, 1954.

During 1953 there was a serious increase in the incidence of viruses, particularly leaf roll [*R.A.M.*, 29, p. 527], in the potato variety Tuquerreña in Cundinamarca and Boyacá, Colombia. In Boyacá diseased plants averaged only five medium or small-sized tubers compared with about 25 from healthy plants.

Timian (R. G.). **Early evaluation of Potato seedlings in breeding for resistance to latent mosaic.** —Abs. in *Iowa St. Coll. J. Sci.*, 28, 3, p. 409, 1954.

Further information is given on the method used in Iowa for detecting susceptible plants in potato progeny segregating for immunity from virus [*R.A.M.*, 34, p. 313]. Susceptible seedlings suitably inoculated showed symptoms within four days and susceptible plants, vegetatively propagated, generally within five to 15 days. Symptoms were expressed from 10° to 24° C., 16° being optimum. Decrease of light intensity under normal winter greenhouse conditions by approximately 300 foot-candles increased the expression of symptoms. Mass inoculation was successfully carried out with a paint spray gun, using 12 gm. of 400 mesh carborundum in 100 ml. of inoculum. Ten isolates of virus X varying from mild to severe were separated, using *Gomphrena globosa* as the local lesion host [34, p. 171], and their reactions studied.

Raymer (W. B.) & Amen (C. R.). **An association of late-breaking virus in Potatoes with a phyllody condition in Ladino Clover.**—Abs. in *Amer. Potato J.*, 31, 11, p. 373, 1954.

A potato disease described as late-breaking virus disease caused up to 3 per cent. infection in Oregon in 1946 [*R.A.M.*, 28, p. 535]. Prevalence increased in 1950 coincident with an increase in acreage of Ladino clover, until in 1953 infection averaged 12 per cent., with up to 36 per cent. in individual fields. In adjacent Ladino clover phyllody was general and proliferation of lateral buds and phyllody affected weed species of *Lactuca*, *Brassica*, and *Erigeron*. Aster leafhoppers [*Macrosteles divisus*] from these fields transmitted aster yellows symptoms to China asters, celery, and lettuce and late-breaking symptoms to White Rose potatoes. The potato virus appears, therefore, to be a strain of the aster yellows complex [cf. *R.A.M.*, 34, p. 478], its spread being correlated with the movement of leafhoppers to potatoes when clover is clipped in spring.

Köhler (E.). **Ein unbekanntes Kartoffelvirus.** [An unknown Potato virus.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, 7, 2, pp. 22–23, 3 figs., 1955.

The new potato virus in Germany [*R.A.M.*, 33, p. 620] has now been given the working designation D 1102. It was inactivated, as indicated by tests on *Gomphrena globosa*, between 68° and 71° C. It has been confirmed as a variant of the Dutch S virus [34, pp. 133, 475] which differs from D 1102 in inducing no symptoms on *G. globosa*. Tomato sap carrying the virus was slightly infectious after dilution to 1 in 1,000 and remained infectious for two or three days, the dilution end point lying nearer to 1 in 10,000.

Estrada Ramos (N.). **El programa de mejoramiento en Papa para obtener resistencia a la 'gota'.** [The Potato improvement programme to obtain resistance to 'blight'.]—*Agricultura trop.*, 10, 3, pp. 51–57, 12 figs., 1954.

This information concerning breeding for resistance to potato blight (*Phytophthora infestans*) in Colombia has already been noticed from another source [*R.A.M.*, 34, p. 57].

Jouin (C.), Hascoet (M.), & Ventura (E.). **Influence du mode de dispersion sur l'activité de l'oxychlorure de cuivre employé dans la lutte contre le mildiou de la Pomme de terre.** [The influence of the mode of dispersion on the activity of copper oxychloride used in the control of Potato blight.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 5, 3, pp. 323–344, 22 graphs, 1 diag., 1955.

Comparative tests were carried out at the Machine Testing Station, Paris, in collaboration with the Laboratory of Phytopharmacy, Versailles, on the treatment of potato blight (*Phytophthora infestans*) with an ordinary spraying machine (working at a pressure of 20 kg. per sq. cm.), a pneumatic sprayer, a dry duster, and a wet duster, each regulated to deliver 5 kg. of copper per ha. Micronized copper oxychloride containing 50 per cent. copper was used as the spray, and the same material mixed with talc to give a copper content of 16 per cent. as the dust [cf. *R.A.M.*, 34, p. 172]. The results obtained demonstrated that the average amount of copper delivered by the machines at the first application was, respectively, 4·46, 6·49, 3·84, and 2·14 kg. per ha., the figures on which these averages were based ranging from 2 to 8·5. The corresponding figures for the amounts of copper deposited were 15 to 18, 9 to 20, 4 to 8, and 2 to 4 γ per sq. cm. leaf surface; only the ordinary sprayer gave a sufficiently constant deposit. The proportion of product applied that remained on the leaves was estimated at 30, 17, 13, and 14 per cent., respectively. Tenacity subsequent to the first application was about 75 and 55 per cent. for the sprayers and dusters, respectively. Efficacy against the disease, expressed as the

number of days intervening after treatment before half the total foliage area was destroyed by infection, was rated at 10, 8, 5, and 6·5 for the four machines, respectively.

It was concluded that the dust treatments were inferior to the spray in the amount of copper delivered, initial retention, and tenacity, and were therefore less effective in control of blight. Pneumatic spraying was inferior to ordinary high-pressure spraying and used more copper. The results given by wet dusting did not appear to be better than those given by dry.

Callbeck (L. C.). **A progress report on the effect of zinc as a constituent of Potato fungicides.**—*Amer. Potato J.*, 31, 11, pp. 341–348, 1954.

This paper surveys the literature on the fertilizing value of zinc and reviews the results of five years' studies in Canada on the effect on late blight (*Phytophthora infestans*) control and on potato yields of including zinc sulphate in the regular copper sprays, and on the treatment of seed pieces and soil with zinc compounds.

In two greenhouse tests and in field plots in 1950, one minute's soaking of the seed pieces in zinc sulphate solution before planting increased the rate of emergence but this effect may be due to decay control rather than to the nutritive value of zinc. No differences in emergence or growth rates were observed from 1951 to 1953, but seed pieces soaked for one minute in 0·08 N solutions of zinc sulphate or zinc acetate produced higher yields than those treated with distilled water or the hydrogen counterparts of the zinc salts. Drill applications of zinc sulphate, zinc acetate (each at 28·8 lb. per acre), and zinc oxide (14·4 lb.) increased yield. In spray tests zinc sulphate, used alone, had some fungicidal value against *P. infestans* and *Alternaria solani* and increased the efficacy of some copper fungicides.

Further experiments in disease-free years or with completely resistant varieties will be necessary before the stimulating effect of zinc on yield can be confirmed.

Castronovo (A.), Thurston (H. D.), & Eide (C. J.). **Parasitic aggressiveness and its relation to late blight tolerant Potato varieties and the survival of the pathogen.**—Abs. in *Amer. Potato J.*, 31, 11, p. 366–367, 1954.

Between different races and between various isolates of the same races of *Phytophthora infestans* [see following abstracts] differences have been observed in infectiveness, incubation period, and sporulation on non-hypersensitive potato varieties. The whole character-complex, referred to as 'aggressiveness', affects the survival and pathogenicity of the isolates. It is concluded that the current assumption that differences among races of the pathogen have little effect on field tolerance and resistance should be questioned and the effect of highly aggressive races on varieties of medium susceptibility considered.

Pristou (R.) & Gallegly (M. E.). **Differential reaction of Potato hosts to foreign and domestic physiologic races of Phytophthora infestans.**—Abs. in *Amer. Potato J.*, 31, 11, pp. 372–373, 1954.

Comparisons of differential potato varieties and physiologic races of *Phytophthora infestans* from Scotland, Holland, the United States, and Canada [see following abstracts] confirmed the validity of the proposed international system of designating genes and races [*R.A.M.*, 34, p. 744]. Only one race (2,3) is missing from the 16 races identifiable with the differential hosts in current use.

Howatt (J. L.) & Grainger (P. N.). **Some new findings concerning Phytophthora infestans.**—Abs. in *Amer. Potato J.*, 31, 11, pp. 369–370, 1954.

Further investigations, using a full set of Black's potato differentials and improved testing techniques, confirmed that race 1,2,3,4 of *Phytophthora infestans* [cf.

preceding and following abstracts] has appeared in the Fredericton area of New Brunswick [cf. *R.A.M.*, 34, p. 57]. A number of so-called races are probably mixtures; there is no evidence that specialized races tend to die out. Certain potato genotypes considered equal as differential hosts in the international system of nomenclature react differently to certain races. There is evidence of heterogeneity in isolates even of monosporous origin [cf. 32, p. 206].

Graham (K. M.). **Distribution of races of Phytophthora infestans (Mont.) de Bary in Canada.**—Abs. in *Amer. Potato J.*, 31, 11, p. 368, 1954.

During 1952 and 1953, 75 isolates of *Phytophthora infestans* were obtained from potato tubers and tomato fruits in Canada [cf. preceding and next abstracts]. No clear distinction between 'potato' and 'tomato' races was apparent. A race tentatively designated 1 (T) and behaving like race 0 on the potato differentials was isolated from Snowflake potato, Rutgers tomato, and a cherry tomato.

Wilson (J. B.). **The interrelationship of Potato and Tomato races of Phytophthora infestans.**—Abs. in *Amer. Potato J.*, 31, 11, p. 376, 1954.

A study was made of the reaction of 29 potato isolates of *Phytophthora infestans* (representing 10 different potato races) on tomato differential hosts, and of 10 tomato isolates (three tomato races) on potato [see preceding abstracts]. The potato isolates fell into four groups: I, weakly to non-pathogenic on all tomato varieties; II, pathogenic only to the recessive varieties Marglobe, Rutgers, and Bonny Best; III, pathogenic to the preceding and to minor-gene varieties Wisconsin '55' and no. 19; and IV, pathogenic to all these and to dominant gene varieties no. 36 and no. 106. Tomato isolates on potato hosts reacted as potato races 0, 3, or 4. Individual isolates of the same potato race sometimes reacted as different races on tomato and vice versa. As tomato genes differ from those known in potatoes, race characteristics of a given isolate should be considered separately on the two hosts.

Ochoa (C.). **Northern Peru, a possible new source of Potatoes resistant to Phytophthora infestans.**—Abs. in *Amer. Potato J.*, 31, 11, p. 371, 1954.

In 1952 over 400 cultivated, wild, and weed potatoes were collected in previously unexplored parts of northern Peru and added to the collection at the Experimental Agricultural Station of Huancayo. In greenhouse tests made at the Department of Plant Pathology and Botany, University of Minnesota, *Solanum chiquidenum* and *S. piurae* proved immune to *Phytophthora infestans* races 0, 1, 4, 1,4, and 2,4 [cf. preceding and next abstracts], the first instance of resistance reported from Peru.

Ferris (Virginia R.) & Peterson (L. C.). **Histological study of suscept-pathogen relationships between Solanum demissum Lindl. derivatives and Phytophthora infestans (Mont.) de Bary.**—Abs. in *Amer. Potato J.*, 31, 11, pp. 367–368, 1954.

Histological examination of sectioned material and cleared whole leaves of *Solanum demissum* derivatives inoculated with races of *Phytophthora infestans* [at Cornell University: *R.A.M.*, 33, p. 686 and preceding abstracts] and incubated at 18° C. showed mycelium in tissue distant from the site of penetration within 17 to 28 hours in susceptible plants but only short hyphae between the mesophyll cells near the site of penetration in resistant plants. In most resistant plants necrosis developed a few hours earlier than in susceptible plants; differences in rapidity among varieties were noted.

Plants duplex for a given resistance gene, inoculated with races pathogenic to simplex plants, developed a different type of lesion. A susceptible reaction was

obtained in the duplex plant when a culture reisolated after serial passages through a plant of the same genotype was used as inoculum.

[An abstract by Virginia R. Ferris under the same title also appears in *Diss. Abstr.*, 14, 11, p. 1899, 1954.]

Grein (A.) & Lorenzini (G.). **La prevenzione contro il Sinchitrium endobioticum.** [The prevention of *Synchytrium endobioticum*.]—*Ann. Fac. Agr. Milano*, N.S., 3, pp. 87–97, 1954. [German summary. Received 1955.]

During 1953 the potato varieties Olympia, Ragis Atlanta, Sommerkrone, and Ragis Corona were compared with a local one for resistance to wart disease (*Synchytrium endobioticum*) at Pianazzo and Madesimo in the Spluga Valley, Chiavenna, northern Italy [cf. *R.A.M.*, 32, p. 692]. All four were unaffected by wart but were highly susceptible to scab (*Actinomyces* [*scabies*]). Olympia gave the highest yields, exceeding those of the local variety in both localities, though the tubers were about the same in size and weight.

Vladimirskaya (Mme N. N.). Значение кислорода для прорастания покоящихся спорангиев **Synchytrium endobioticum (Schilb.) Perc.** [The importance of oxygen for the germination of resting sporangia of *Synchytrium endobioticum* (Schilb.) Perc.]—Микробиология [*Microbiology, Moscow*], 23, 1, pp. 72–75, 1 fig., 1954.

At the Scientific Research Station for Potato Wart, Leningrad, U.S.S.R., a reduction in the oxygen content of the air from 16 to 3 per cent. reduced the percentage germination of the resting sporangia of *Synchytrium endobioticum* [*R.A.M.*, 33, p. 686] by an average of 21 in water and 12 on filter paper. The small reductions in oxygen content (0·2 to 0·4 per cent.) of soil air in the tilled layers are insufficient to affect sporangial germination at lower soil depths.

Muncie (J. H.). **Resistance of Potatoes to Verticillium albo-atrum.**—Abs. in *Amer. Potato J.*, 31, 11, p. 371, 1954.

Tests were made with 110 seedlings and eight commercial potato varieties to determine field resistance to *Verticillium albo-atrum* [*R.A.M.*, 33, p. 59]. The plants were grown in ten hill blocks in soil infested with a composite laboratory culture of isolates from several areas in [Michigan] State. Plate cultures from the tubers indicated that 24 seedlings and one commercial variety remained free from infection. Of the 94 infected tuber lots, 86 showed vascular browning at the stem end of the tuber. The pathogen was isolated also from non-discoloured tissue from 18 lots.

Akeley (R. V.), Stevenson (F. J.), Schultz (E. S.), Bonde (R.), Nielsen (K. F.), & Hawkins (A.). **Saco : a new late-maturing variety of Potato, immune from common race of the late blight fungus, highly resistant to, if not immune from net necrosis, and immune from mild and latent mosaics.**—*Amer. Potato J.*, 32, 2, pp. 41–48, 1955.

The late-maturing, high-yielding, new variety Saco (U.S.D.A. B 606–67) is susceptible to *Verticillium* wilt [*V. albo-atrum*: *R.A.M.*, 34, p. 243] but yields well even in infected soil. It is immune from the common race of the late blight fungus [*Phytophthora infestans*], highly resistant to, if not immune from net necrosis (attributed to current season infection with leaf roll virus), and immune from mild mosaic (virus A+virus X) and latent mosaic (virus X) [34, p. 313]. It is the first virus X immune variety released in the United States.

Logsdon (C. E.) & Eide (C. J.). **Effect of temperature on the development of ring rot.**—Abs. in *Amer. Potato J.*, 31, 11, p. 370, 1954.

Ring rot (*Corynebacterium sepedonicum*) in 1953 caused losses of 10 to 15 per cent.

in the Alaskan potato crop [cf. *R.A.M.*, 33, p. 558]. The optimum temperature for the growth in culture of isolates from Alaska and Minnesota was 15° C. and the optimum soil temperature for the development of the disease (Minnesota isolate) 25°. At 16°, 87 per cent. of the plants became infected, 28 per cent. wilting completely. At 25°, 100 per cent. became infected and 87 per cent. wilted. There was little difference in the tuber infection (50 and 55 per cent. respectively).

Arnold (G.). **A study of Corynebacterium sepedonicum of Solanum tuberosum as related to host resistance and spread by water.**—Abs. in *Amer. Potato J.*, 31, 11, p. 366, 1954.

In research on the nature of the resistance of certain potato varieties to ring rot (*Corynebacterium sepedonicum*) [see preceding abstract] there was no consistent difference in the development of the bacterium on media prepared from extracts of susceptible and resistant varieties. Six weekly applications of water suspensions of *C. sepedonicum* to potted greenhouse potato plants, combined with stabbing the soil, was the most effective method of inoculation, indicating that water can be a factor in the spread of ring rot and that the likelihood of infection is increased by previous injury to underground parts of the plant.

Schaal (L. A.) & Johnson (G.). **The inhibitory effect of phenolic compounds on the growth of Streptomyces scabies in culture medium.**—Abs. in *Amer. Potato J.*, 31, 11, p. 374, 1954.

In tests with three races of *Streptomyces* [*Actinomyces*] *scabies* from potato, grown on Czapek's agar to which various amounts of phenolic compounds were added, the importance of chlorogenic acid for scab resistance [*R.A.M.*, 33, p. 555] was shown to be due mainly to the formation of quinones by enzyme action in the tuber, inhibition in culture being more pronounced at a higher pH when autoxidation of the phenolic compounds increased quinone production. Growth of the most virulent race was depressed less than that of the mildly virulent.

Large (E. C.) & Honey (June K.). **Survey of common scab of Potatoes in Great Britain, 1952 and 1953.**—*Plant Path.*, 4, 1, pp. 1–8, 1 fig., 2 maps, 1955.

The results obtained in surveys made in 1952 and 1953 of the incidence of scab (*Streptomyces* [*Actinomyces*] *scabies*) [*R.A.M.*, 33, p. 244] in some 2,500 potato crops in Great Britain are summarized, the data being extracted from thousands of record forms at the Statistics Section of the Potato Division, Ministry of Food, Oxford, and the main part of the analysis completed at the Plant Pathology Laboratory, Harpenden. In each field a number of 3-yd. sample lengths of drill selected at random were lifted by hand in late September or early October. The produce from each was graded and weighed and the ware tubers sorted into three categories: (*a*) free from scab, or with less than $\frac{1}{8}$ of the surface area affected; (*b*) $\frac{1}{8}$ to $\frac{1}{4}$ affected; and (*c*) with $\frac{1}{4}$ or more affected. The mean weight of the tubers in each category in each field was returned as tons per acre, together with particulars of variety, location of crop, soil type, acreage, and (in 1953) year in which the field was last ploughed up from grass. A crop was regarded as 'substantially affected' if 3 lb. per cwt. ($2\frac{3}{4}$ per cent. by weight) or more of the tubers bore lesions covering at least $\frac{1}{4}$ of the surface, or if 50 per cent., or more, were at least $\frac{1}{8}$ covered.

Incidence was much lower in 1953, when June and July were mostly cool and wet, than in 1952 when these months were dry, with abnormally high temperatures in most areas. In the latter year, about 1 per cent. of the total yield of ware from all crops fell into category (*c*) as against only 2 per cent. in 1953.

Incidence was highest in parts of Yorkshire and the East and West Midlands and lowest in Scotland, most of Lancashire, and the Fens. Much less scab was found

on King Edward than on Majestic. The results showed that when the economic significance of common scab is considered, it should be borne in mind that the disease tends to be more severe when potatoes are scarce, after a dry season, than when they are plentiful, after a wet one.

Ives (June V.). **An abnormal form of skin spot on Potatoes.**—*Plant Path.*, 4, 1, pp. 17–21, 1 pl., 1955.

In March, 1951, two samples of ware potatoes with an unusual form of skin spot (*Oospora pustulans*) [*R.A.M.*, 33, p. 504] were received by the National Agricultural Advisory Service, Cambridge, from Soham and Waldersea, Cambridgeshire. Many of the lesions were 1 cm. in diameter and 6 mm. deep, and the tubers were unsaleable. In the clamp of Majestic at Soham almost every tuber was affected, while at Waldersea nearly half of a 20-ton lot of King Edward was spoiled. Both lots of tubers had been treated at lifting with a dust containing *iso*propyl phenyl carbamate (IPC) to delay sprouting. Clamps of untreated potatoes on both farms were unaffected. During the spring of 1952 some 20 more samples, representing over 1,000 tons of potatoes, with similar symptoms were received from different parts of the eastern [agricultural] province. In every case IPC had been used and *O. pustulans* was isolated from the lesions. In some clamps containing treated and untreated tubers from the same fields, the treated tubers had abnormal, and the untreated normal lesions. The varieties affected were mainly King Edward and Majestic, but Red King and Conference were also involved.

While it was not found possible to reproduce the abnormal symptoms experimentally, other evidence obtained indicated that IPC is capable of retarding the formation of a cork layer under skin spot lesions or cut surfaces. Skin spot appears to develop best in cold, damp conditions. In 1952, the January and February temperatures were markedly below the average in eastern England.

Nielsen (L. W.) & Sparks (W. C.). **Bottleneck tubers and jelly-end rot in the Russet Burbank Potato.**—*Res. Bull. Idaho agric. Exp. Sta.* 23, 24 pp., 4 figs., 1953.

When grown under irrigation in Idaho, potatoes of the Russet Burbank variety produce a high proportion of malformed tubers, bottle-necks and dumb-bells being the commonest. These result from secondary growth following irrigation after a period of retarded growth under drought conditions. The stem ends of these tubers have a lower specific gravity than normal and frequently develop glassy-end and jelly-end rot [*R.A.M.*, 33, p. 176]. Long tuber varieties including Russet Burbank, Burbank, White Rose, and Wurst Kartoffel are more susceptible to these disorders than those with round tubers such as Sebago, Pontiac, Menominee, and Charles Downing. The authors, after reviewing previous references, describe the various pathological conditions and their relation to environment.

Adsuar (J.). **A mosaic disease of Sweetpotato, Ipomoea batata[s], in Puerto Rico.**—*J. Agric. Univ. P.R.*, 39, 1, pp. 49–50, 1 fig., 1955.

A virus causing a mosaic disease and stunting of sweet potato was found recently in Puerto Rico. It occurs throughout the island wherever the crop is grown and is capable of attacking the best commercial varieties. In the field it appears as a distinct mosaic mottling on the younger leaves which eventually become chlorotic, wrinkled, and sometimes puckered. Where infection is less obvious laboratory testing by tuber- or cleft-grafting usually produces very severe symptoms in susceptible varieties in three to four weeks.

So far the virus has only been transmitted by grafting, the most reliable and rapid method being plug-grafting. The varieties U.P.R. 3, U.P.R. 4, L. 240–7, M.M. 7, V. 10–10, L. 224, L. 138, L. 225, and L. 241 proved susceptible, as was the

common weed *Ipomoea rubra*. The disease resembles that caused by the feathery mottle virus [*R.A.M.*, 34, p. 249] but differs in not being transmissible by rubbing to sweet potato or *I. purpurea*. The only other virus diseases it resembles are those reported from Africa [32, p. 64].

JOHNSTON (A.). **Preliminary notes on physiological diseases of Rice in Malaya.**—*News Lett. int. Rice Comm.* 10, pp. 16–18, 1954.

The name 'penyakit merah' is the one most commonly applied to a type of non-parasitic rice disease in Malaya. The author distinguishes three types of such disease and gives full details of the symptoms. In type A as the disease develops the tips of the older leaves show marked reddening, a zone of reddish speckling intervening between this and the normal green part of the leaf. In type B small, irregular, diffuse yellow areas appear towards the leaf tips, subsequently spreading and coalescing. Drying out of the leaf then begins, at first from the tip marginally, and finally the whole leaf dries; there is no reddening. Type C is somewhat similar to B, but the young leaves have a dark, blue-green tinge, unlike normal plants. In all three diseases the root system is affected to a varying degree and the number of healthy roots is below normal. These diseases are widespread in Malaya, though each type predominates in certain areas. They occur in patches and incidence varies from year to year. It is suggested that deficiency of a major nutrient may play a part in the trouble and investigation is in progress.

CORBETTA (G.). **Concimazione potassica e azotata e malattie parassitarie del Riso.** [Potassium and nitrogen amendments and parasitic diseases of Rice.]—Reprinted from *Riso*, 2, 11 pp., 1954. [Received 1955.]

In 1953 a series of fertilizer experiments was conducted on a rice planting at Rovasenda where yields had consistently been reduced by severe attacks of fungus diseases, including *Helminthosporium oryzae* [*Ophiobolus miyabeanus*], *Sclerotium oryzae* [*Leptosphaeria salvinii*: *R.A.M.*, 33, p. 445], and *Piricularia oryzae*. Potassium was applied as 3, 6, or 9 q. potassium chloride per ha. and nitrogen as 2, 4, or 6 q. calcium cyanamide or ammonium sulphate. The whole experimental area was treated with 1·8 q. calcium cyanamide, 1·8 q. potassium chloride, and 6 q. mineral perphosphate [? superphosphate] per ha.

In all cases the potassium amendments gave greater yields and increased the resistance of the plants to the above diseases. Excessive nitrogenous fertilization should be avoided, however, since it rendered the plants more susceptible to *P. oryzae* [33, p. 112]. On heavy soil, as in these experiments, it is advisable to use calcium cyanamide as the basic fertilizer, employing ammonium sulphate at very low rates only when needed as a growth stimulant.

PODHRADSZKY (J.). **The brusone disease of Rice and control possibilities are reflected by research work carried on in Hungary.**—*Növén. Idős. Kérdés., 1954*, 1, pp. 1–5, 1954. [Abs. in *Hung. agric. Rev.*, 3, 2, p. 11, 1954.]

The 'brusone' disease of rice due to *Piricularia oryzae* [*R.A.M.*, 30, p. 487] and its control in Hungary are discussed. The control measures include the use of healthy seed, early sowing, applications of potassium and phosphorus fertilizers to counterbalance the nitrogen effect, liming of heavy acid soils, draining the water off for a few days when *P. oryzae* spots appear, burning of decayed plants, and the extermination of weeds. Stubble burning should be followed by deep ploughing in autumn.

AKAI (S.) & ITOI (S.). **Studies on Helminthosporium blight of Rice plants. V. Effect of copper sulphate on the germination of the causal fungus, Cochliobolus**

(Ophiobolus) miyabeanus.—*Bot. Mag., Tokyo*, 67, 787–788, pp. 1–5, 4 graphs, 1954.

In a further contribution to this series from Kyoto University [cf. *R.A.M.*, 34, p. 104] the effect of immersing conidia of *Ophiobolus miyabeanus* in dilute copper sulphate solutions (0·25 to 2 per cent.) was investigated. The germination of the conidia decreased with the increase in copper absorbed. Treating copper-immersed conidia with 0·1 per cent. hydrochloric acid (pH 1 to 3) restored the germination capacity to a level comparable with that of the untreated. Distilled water and alkaline solution did not have this effect.

Brown (J. C.), Holmes (R. S.), Shapiro (R. E.), & Specht (A. W.). **Effects of phosphorus and copper salts on iron chlorosis of Rice in flooded and nonflooded soil and the associated enzymatic activity.**—*Soil Sci.*, 79, 5, pp. 363–372, 1 fig., 1 graph, 1955.

In greenhouse experiments at the Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland, Caloro rice developed chlorosis, apparently due to iron deficiency [*R.A.M.*, 18, p. 702], on non-flooded but not on flooded, naturally calcareous soil. In plants grown in the flooded soil the activity of catalase was higher and that of ascorbic acid [vitamin C] oxidase lower than in those on the non-flooded sites. Rice grown on a flooded, calcareous-organic soil mixture was very liable to chlorosis with increased additions of phosphorus and copper salts. Added together, these two elements were shown to be very effective in limiting the absorption and utilization of iron by plants grown on the mixed soil, a process which is believed to contribute to the development of chlorosis.

Young (H. E.). **Crown budding for Oidium resistance.**—*Adv. Circ. Rubb. Res. Inst. Ceylon* 32, 4 pp., 2 figs., 1954. (Revised).

The information in this circular on crown budding rubber for resistance to mildew (*Oidium heveae*) [*R.A.M.*, 34, p. 60] in Ceylon has already been noticed from another source [31, p. 630].

Bolle-Jones (E. W.). **Nutrition of Hevea brasiliensis. I. Experimental methods.**—*J. Rubb. Res. Inst. Malaya*, 14, *Commun.* 289, pp. 183–207, 5 pl., 1 diag., 7 graphs, 1954.

In preliminary studies carried out at the Soils Division, Rubber Research Institute, Kuala Lumpur, Malaya, on the mineral nutrition of *Hevea* rubber [cf. *R.A.M.*, 30, p. 192] it was found that plants deficient in magnesium displayed an interveinal chlorosis near the midrib of the mid-stem leaves and were weaker and bore fewer leaves than plants grown in complete nutrient. Acute iron deficiency caused marked defoliation, death of the growing-point, and chlorosis of the young laminae. In potassium-deficient plants a general paleness and chlorosis of the mid-stem laminae, with chlorotic mottling of the leaflets, developed, followed by marginal scorch. Phosphorus deficiency caused stunting, thin stems, and small leaves.

Boswell (J. G.). **The microbiology of acid soils IV. Selected sites in northern England and southern Scotland.**—*New Phytol.*, 54, 3, pp. 311–319, 1955.

The frequency of fungi in soil samples taken from several localities at altitudes above 225 m. between Sheffield and the valley of the Tweed from 1946 to 1949 and examined by a plating-out technique was estimated from the ratio between the number of plates on which a particular fungus appeared and the total number of plates prepared from that locality. Species of *Aspergillus* and *Alternaria* occurred occasionally throughout the studies, while *Zygorrhynchus* spp. accounted for about 80 per cent. of the total records. Species of *Penicillium*, *Saccharomyces*, *Pullularia*, *Cladosporium*, *Botrytis*, *Cephalosporium*, *Trichoderma*, *Verticillium*, *Stemphylium*,

and of the Mucorales were recorded. *Penicillium* predominated in the pH range below 4·5. An increase in acidity down to pH 3·5 appeared to decrease the frequency with which the fungi appeared without markedly affecting the total number of fungus groups present.

Henderson (Moira E. K.) & Farmer (V. C.). **Utilization by soil fungi of p-hydroxybenzaldehyde, ferulic acid, syringaldehyde and vanillin.**—*J. gen. Microbiol.*, 12, 1, pp. 37–46, 1955.

In an investigation at the Macaulay Institute for Soil Research, Craigiebuckler, Aberdeen, most of the 59 soil isolates of Fungi Imperfecti and two of *Mucor* were found to attack *p*-hydroxybenzaldehyde, ferulic acid, syringaldehyde, and vanillin, which were used as sole sources of carbon by the organisms tested. The most active were *Alternaria* sp., *Aspergillus* sp., *Chaetomella* sp., *Coniothyrium* sp., *Cylindrocarpon* sp., *Hormiscium* spp., *Hormodendrum* spp., *Penicillium* sp. (No. 8), *Pyrenochaeta* sp., *Sphaeronema* sp., and *Torula* spp. Spectrochemical methods and paper chromatography demonstrated that vanillin and ferulic acid were converted to vanillic acid and that syringaldehyde was converted to syringic acid. There appeared to be a correlation between the ability to utilize these compounds and to oxidize tannic acid, but as it is likely that an enzyme system different from the polyphenoloxidase type present in wood-rotting fungi is involved this correlation may not be significant. The utilization by soil fungi of the phenolic compounds tested may constitute a stage in the decomposition of lignin. It has been shown that certain wood-rotting fungi will release vanillin and vanillic acid from spruce sawdust [*R.A.M.*, 34, p. 500] and it would seem that the combined activities of these different fungi may be concerned in the breakdown of lignin under natural conditions.

Jacks (H.). **Disinfection of nursery soil.**—*Bull. N.Z. Dep. Agric.* 363, 12 pp., 10 figs., [? 1953].

Brief descriptions are given of the chief methods of soil disinfection [*R.A.M.*, 32, p. 695] by heat and chemical treatments, with special application to small quantities of soil.

Saldarriaga Vélez (A.). **Influencia de tres insecticidas sobre la población de microorganismos del suelo.** [The effect of three insecticides on the numbers of soil micro-organisms.]—*Acta agron. Palmira*, 4, 1, pp. 45–67, 2 figs., 6 graphs, 1954. [English summary.]

In studies at Valle, Colombia, to determine the effect of insecticide treatments on the microbial population in a fertile tropical soil by means of the dilution plate technique, 20 kg. BHC per ha. increased the fungi significantly [cf. *R.A.M.*, 31, p. 193], 4 kg. chlordane per ha. reduced them slightly, while the extreme doses of 4 and 20 kg. toxaphene per ha. stimulated the numbers significantly, though 10 kg. had no significant effect. Bacteria responded to toxaphene only, increasing in numbers with 4 kg. per ha., but not with stronger applications.

Román (I. S.). **Ensayos preliminares en Chile sobre diagnóstico de deficiencias nutritivas en los vegetales por medio de inyecciones.** [Preliminary trials in Chile on the diagnosis of mineral deficiencies in plants by means of injections.] —*Agricultura téc., Santiago*, 13, 2, pp. 155-158, 1953. [English summary. Received 1955.]

The application to various crops on alluvial soil of pH about 8 in experimental plots in Santiago, Chile, of the Roach plant-injection technique for diagnosing mineral deficiencies [*R.A.M.*, 18, p. 539; 34, p. 527] resulted in strong positive reactions in apples, cherries, and lemons to iron, manganese, and phosphorus.

Iljin (W. S.). **Bioquímica de plantas cloróticas desarrolladas en suelos calcáreos.** [Biochemistry of chlorotic plants grown in calcareous soils.]—*Agron. trop., Maracay*. 3. 3. pp. 175–200. 1953. [English summary.]

A comparative analysis of healthy and chlorotic sugar-cane and groundnut plants grown on calcareous soils in Venezuela during 1952 [cf. *R.A.M.*, 29. p. 287] revealed profound alterations in the metabolism and chemical composition of the chlorotic. The calcareous soils contained more moisture, carbonates, organic material, and total nitrogen, calcium, magnesium, potassium, and phosphorus than normal soils but less iron and aluminium and approximately equal quantities of manganese. The quantity of total iron or phosphorus in the plant is not correlated with chlorosis. Soil applications of iron or copper, or preferably both, favoured chlorophyll development in chlorotic leaves. Chlorotic plants consistently contained a larger quantity of potassium and more magnesium than normal but the calcium content was normal. Chlorosis was accompanied by the accumulation of soluble salts in the cell sap and total salts in the ash. Severe chlorosis, however, did not significantly affect carbohydrate formation. The initial effect appeared to be a reduction in the synthesis of di- and polysaccharides. Chlorosis also stimulated the excessive production of citric acid and raised the ascorbic acid [vitamin C] content. Chlorotic plants accumulated protein derivatives and had a greater concentration of soluble nitrogenous substances, while recovery was accompanied by a decrease in all forms of nitrogen.

Carnes (G.). **Try a chelating agent.**—*N.J. Agric.*, 36. 4. pp. 8–9. 11. 2 figs., 1954.

This is a popular account of the control of chlorosis of ornamental plants in New Jersey due to iron deficiency by the use of ethylenediamine tetra-acetic acid (EDTA) [*R.A.M.*, 33, p. 318; 34, p. 749].

Mikola (P.). **Metsämaan kantasienien kyvystä hajoittaa neulas-ja lehtikarikkeita.** [Experiments on the ability of forest soil basidiomycetes to decompose litter material.]—*Commun. Inst. for. Finl.*, 42. 7. 17 pp., 1 graph. 1955. [English summary.]

From the Forest Research Institute, Helsinki, Finland, the author presents the results of experiments on the growth in pure culture of 41 species of basidiomycetes on needle and leaf litter [cf. *R.A.M.*, 25, p. 518]. 0·5 gm. of which was placed in a test-tube or Petri dish and supplemented after autoclaving by 5 ml. of a mineral nutrient solution. The cultures were maintained at a temperature of 19° to 20° C., and at the end of the investigation the litter was dried at 105° and weighed.

Active decomposers of lignin, as indicated by discoloration of the litter, were *Clavaria ligula*, *Clitocybe cerussata*, *C. clavipes*, *C. odora*, *Collybia butyracea*, *C. dryophila* [*Marasmius dryophilus*], *Hypholoma fasciculare*, *Marasmius perforans*, *Mycena galopus*, *M. lactea*, *M. rosella*, *M. sanguinolenta*, *Pholiota mutabilis*, *Polyporus* [*Fomes*] *annosus*, *P. betulinus*, and *Stropharia depilata*. Decomposition without discoloration was effected by *Armillaria mellea*, *Laccaria laccata*, *Mycena epipterygia*, and *M. metata*. Mycorrhizal fungi, e.g., *Boletus luteus*, *B. variegatus*, and *Cenococcum graniforme* [*C. geophila*: 28. p. 411: 34. p. 52], made little or no growth on litter.

The litter of birch, aspen, and other hardwoods was disorganized much more rapidly than that of spruce and pine needles. Particularly active in the decomposition of birch litter were *Collybia butyracea*, *M. dryophilus*, and *S. depilata*.

Some efficient decomposers of litter *in vitro*, e.g., *Collybia* spp., were of limited occurrence in the natural forest, being restricted by the competition of other species.

Campbell (L.). **Control of Mint rust by premerge treatment with dinitro amine.**—*Down to Earth*, 10, 4, pp. 6–7, 1955.

Mint rust (*Puccinia menthae*) is not easily controlled with fungicide dusts while

growing; in addition the oil is in danger of contamination [*R.A.M.*, 32, p. 644]. At the Western Washington Experiment Station, Puyallup, investigations with herbicides and fungicides as pre-emergence sprays showed dinitro amine to be among the most promising materials. At approximately 3 lb. in 40 or 60 gals. water per acre it gave almost complete control (99·7 per cent. fewer rust pustules at harvest in one field than in an untreated field in 1954), besides destroying weeds and, in one test, increasing the mint hay by 27·4 per cent.

Jary (Catherine L.). **The new varieties of Hops.**—*J. Minist. Agric.*, 62, 1, pp. 30–34, 1955.

Verticillium [*albo-atrum*: *R.A.M.*, 34, p. 751] wilt now affects about 200 hop farms, more than a quarter of all hop farms in south-east England, and about one-fifth in the whole country, together about 3,000 acres and roughly one-seventh of the total hop acreage. The use of picking machines is likely to increase the rate of spread, and the varieties now grown, mainly Fuggle, will have to be replaced by resistant (tolerant) sorts. Two 'stop-gap' varieties, '1147' and O.T. 48 [34, p. 398], are being used provisionally. Of the newer seedlings raised at East Malling Research Station in 1946, C2, D1, D3, and J2 [loc. cit.] were selected for cropping and brewing trials and should be available to growers in 1959 or 1960. Most of the named new varieties and some wilt-tolerant seedlings are more susceptible than Fuggle to downy mildew [*Pseudoperonospora humuli*: loc. cit.].

Malaguti (G.). **Una podredumbre del tallo del Ajonjolí (Sesamum indicum L.) causada por Phytophthora.** [A stem rot of Sesame (*Sesamum indicum* L.) caused by *Phytophthora*.]—*Agron. trop., Maracay*, 3, 3, pp. 201–204, 1 pl., 1953.

For some five years plantings of sesame first in the Aragua Valley, Venezuela, and later to a lesser degree in Portuguesa and Falcón have suffered from stem necrosis, particularly on heavy, badly drained soils or when heavy rainfall or faulty irrigation caused prolonged waterlogging. The first symptom is a damp, blackish lesion on the collar at or below soil level. It spreads rapidly to the stem and branches, either girdling the stem and strangling the basal part or extending in irregular, vertical streaks. The main root is also affected and the plants are easily removed from the soil leaving the rootlets and rotten cortex behind. The leaves, flowers, and branch tips wither and hang downwards. The plant may be attacked at any stage but mostly at the time of flowering. A peculiarity of the disease in Venezuela is that it attacks the tip of the stem and the leaves of newly germinated seedlings, causing a type of blight.

A *Phytophthora* sp. [cf. *R.A.M.*, 28, p. 195] belonging to the *P. parasitica–P. palmivora* group [30, p. 433] was consistently isolated from affected parts, frequently in association with *P. hibernalis*. Pathogenicity was established using the former alone or the two species together, both by setting seedlings in pots containing infested soil, which reduced germination by 73 per cent., and by inoculating adult plants through stem wounds with a fragment of agar culture. There was little difference in varietal susceptibility. The pathogen is endemic in many areas. Flooding for 24 hours in a planting at Gonzalito, Aragua, caused 34·4 and 39·6 per cent. infection in two separate tests. The disease has also occurred in an experimental planting of *Sesamum radiatum* at the National Institute of Agriculture, Maracay. Both safflower and tomato fruits were severely parasitized in inoculation experiments.

Spence (J. A.). **Sugar Cane diseases in British Guiana.**—*Sug. Bull., Georgetown*, 22, pp. 73–75, 1954.

In further varietal trials in relation to sugar-cane leaf scald [*Xanthomonas albilineans*: *R.A.M.*, 33, p. 319] in British Guiana, 44 potentially commercial

varieties were assessed as resistant and 77 tolerant. Some correlation has been observed between leaf-scald resistance and high amino-acid content of canes, measured chromatographically. Further study of this is in progress.

Symptoms suggestive of ratoon stunting [cf. 33, p. 503 and following abstracts] were observed on one variety, B.4098, in some west coast estates, and this is being investigated.

Chlorotic streak virus [33, p. 319] continued to occur throughout the cane-growing area, but apparently caused no reduction in yield.

Mungomery (R. W.). **Clean Cane for combating ratoon stunting disease.**—*Cane Gr. quart. Bull.*, 17, 3, pp. 92–93, 1954.

This information on the control of sugar-cane ratoon stunting disease in Queensland by hot-water treatment has already been noticed [*R.A.M.*, 33, pp. 502, 503]. It is hoped soon to build up sufficient stocks of healthy planting material to supply all growers and its use will then be compulsory.

Pembroke (E. A.). **Hot water treatment Cane plants versus untreated.**—*Cane Gr. quart. Bull.*, 17, 3, p. 94, 1 fig., 1954.

The hot-water treatment method recommended for the control of sugar-cane ratoon stunting disease [see preceding abstract] has given better germination than that of untreated cane, and despite the time and labour involved many hundreds of tons of cane have been treated in various mills in Queensland.

Orian (G.). **La maladie du rabougrissement de la Canne à Sucre.** [The stunting disease of Sugar-cane.]—*Rev. agric. Maurice*, 33, 6, pp. 275–284, 1954.

Ratoon stunting disease of sugar-cane [see preceding abstracts], not previously recognized in Mauritius, was found to be present in 1954. Control by hot-water treatment at 50° C. for two hours [loc. cit.] was found to be unsuitable for some varieties, 134/32 in particular. A much better result was obtained by hot-air treatment as applied in the United States [*R.A.M.*, 34, p. 64]. The hot-water treatment (52° for 20 minutes) of cuttings against chlorotic streak [33, p. 658] is too severe to apply during the long period necessary for control of ratoon stunting. Other precautions against this disease include disinfection of the cane cutting knives with either 1 per cent. dettol or phenol, 2½ per cent. lysol, 10 per cent. formalin, or 50 per cent. alcohol, which destroy the virus in 10 minutes. It is essential to ensure that only clean cuttings are used for planting.

Two new Cane varieties released.—*Sugar, N.Y.*, 50, 8, p. 43, 1955.

The release of two new sugar-cane varieties for commercial planting during the autumn of 1955 is jointly announced by the United States Department of Agriculture, the Louisiana State Experiment Station, and the American Sugar Cane League. Both C.P. 48–103 and C.P. 47–193 are described as resistant to sugar-cane mosaic virus and moderately so to red rot [*Glomerella tucumanensis*]. They are further reported to have responded favourably to heat treatment for the elimination of [ratoon] stunting virus [*R.A.M.*, 34, p. 675], to which, however, they appear to be no more susceptible than the present commercial varieties.

Evans (H.). **Studies in the mineral nutrition of Sugar Cane in British Guiana. I—A preliminary survey of the nutrient status of Sugar Cane using rapid fresh tissue tests.**—*Trop. Agriculture, Trin.*, 32, 2, pp. 124–133, 2 figs., 2 graphs, 1955.

Rapid tissue tests [*R.A.M.*, 34, p. 386] combined with visual diagnosis enabled the author to form an approximate picture of the most important aspects of the nutritional status of sugar-cane in British Guiana. Potassium tended to be insuf-

ficient in some areas in the east and west coast Demerara estates. Phosphate was low in many samples, particularly those from Berbice. Calcium deficiency induced visual symptoms in some Demerara fields. Aluminium toxicity caused considerable stunting of the cane in pegassy areas; in one area magnesium toxicity had the same effect. Molybdenum was present only in very low concentrations and deficiency symptoms were observed.

Story (C. G.). **Copper deficiency in the Central Area.**—*Cane Gr. quart. Bull.*, 18, 2, p. 61, 2 figs., 1954.

It is reported that an application of 55 lb. per acre of copper sulphate satisfactorily controlled copper deficiency in sugar-cane plants in the Mackay district [Queensland].

Fergus (C. L.). **An index to L. O. Overholts' Mycological Notes.**—*Mycologia*, 47, 1, pp. 140–144, 1955.

This is an alphabetical epithet index to the genera and species described in the 13 papers comprising L. O. Overholts' Mycological Notes [*R.A.M.*, 22, p. 454], 12 of which appeared in *Mycologia* (1920–1943) and one in *Bull. Torrey bot. Cl.*, 49, 1922.

Mason (E. W.). **Literature, Science and the Naturalist.**—*Naturalist, Lond., 1954*, April–June, pp. 41–46, 1954.

In his Presidential Address delivered to the Yorkshire Naturalists' Union, Halifax, the author outlined the history and activities of the Commonwealth Mycological Institute, with special reference to the taxonomic problems encountered in his work in the Herbarium.

Bagchee (K.) & Bakshi (B. K.). **Studies on Indian Thelephoraceae I. Some species of Stereum, Peniophora, and Corticium.**—*For. Bull. Dehra Dun* 166 (N.S.), 11 pp., 2 pl., 13 figs., 1954.

This paper contains descriptions of 14 species of Indian Thelephoraceae, six of them new to India, collected from temperate and subtropical regions, mainly on dead wood, and preserved at the Forest Research Institute, Dehra Dun.

Baxter (D. V.). **Some resupinate Polypores from the region of the Great Lakes. XXVI.**—*Pap. Mich. Acad. Sci.*, 40 (*1954*), pp. 91–108, 6 pl., 1955.

The present paper in this series [cf. *R.A.M.*, 33, p. 565] lists the known resupinate polypores of Canada, Alaska, and the United States under hosts and sites. It is noted that the fungi causing the greatest decay losses in timber and timber products in the Lake States region are believed to be widely distributed over North America. The most ubiquitous are *Lenzites saepiaria*, *Polyporus* (*Polystictus*) *abietinus*, *Polyporus adustus*, and *P. pargamenus*, all recorded from 60 or more States, and *Fomes pini* [34, p. 681] from 58. A specific description is given of *Poria vaillantii* [33, p. 185], together with a list of synonyms, allied species, and hosts. The fungus is distributed over most of the Canadian provinces and the northern United States. Its economic importance in North America, however, is of a purely local character.

Pinto-Lopes (J.). **Culture-collection of fungi. I. Hymenomycetes.**—39 pp., Faculdade de Ciências, Lisboa, 1954. [Received 1955.]

Part I of the 1954 edition of this annual list of fungus cultures maintained at the Faculty of Sciences, University of Lisbon, Portugal, is devoted to the Hymenomycetes [cf. *R.A.M.*, 29, p. 372], of which there are 507 strains (350 Polyporaceae).

Bohus (G.). **A kalaposgombákra (Agaricales) vonatkozó rendszertani és ökológiai kutatások eredményei I.** [Results of systematic and ecological researches

relating to the Agaricales.]—*Bot. Közl.*, 44, 1–2, pp. 59–62, 2 col. pl., 1 fig., 1954. [Russian and French summaries.]

The author is of opinion that *Clitocybe tabescens* is a variety of *C. mellea* [*Armillaria mellea*: cf. *R.A.M.*, 32, p. 698] as a result of cultural studies.

Sprague (T. A.). **The rust fungi (Uredinales) of Gloucestershire.**—*Proc. Cotteswold Nat. Fld Cl.*, 31, 2, pp. 86–100, 1952. [Received 1955.]

The nomenclature of this list of 143 species follows in the main Wilson and Bisby's list of British Uredinales [*R.A.M.*, 33, p. 757], but there are a number of differences in synonymy.

Shanor (L.). **Some observations and comments on the Laboulbeniales.**—*Mycologia*, 47, 1, pp. 1–12, 1955.

In his presidential address to the Mycological Society of America, presented on 6th September, 1954, at Gainesville, Florida, the author commented briefly on the study of the Laboulbeniales in the past and indicated that further investigation of their taxonomy, morphology, distribution, and nutrition offered a promising field for future research.

Zambettakis (C.). **Clés dichotomiques des genres et des espèces des Phaeodidymae de la famille des Sphaeropsidaceae.** [Dichotomous keys to the genera and species of the Phaeodidymae of the family Sphaeropsidaceae.]—*Ann. Inst. phytopath. Benaki*, 7, 2, pp. 112–160, 3 pl., 1953.

The author has examined over 2,000 herbarium specimens and more than 50 strains of the Phaeodidymae and presents dichotomous keys for the identification of 23 genera and the species belonging to this group. A specific epithet index is cross-referenced to the genera and species in the keys.

Kern (H.). **Taxonomic studies in the genus Leucostoma.**—*Pap. Mich. Acad. Sci.*, 40, pp. 9–22, 1 fig., 4 graphs, 1955.

The author discusses the genus *Leucostoma sensu stricto* and gives descriptions of the species *L. persoonii* (*Valsa leucostoma*), *L.* (*V.*) *cincta*, *L.* (*V.*) *nivea*, and *L.* (*V.*) *kunzei* collected in Michigan in 1953, reaching the conclusion that the main questions in the taxonomy of the genus are still open. The spore size within one species may vary over a wide range and until intermediate forms are found, extreme strains of one series may seem to be different species. This, and the variability of stromatic parts within different host tissues and under other external conditions, hampers the delimitation of species on a morphological basis.

Dietrichson (E. de L.). **Étude d'une collection norvégienne de levures (2e partie).** [Study of a Norwegian yeast collection (2nd part).]—*Ann. Parasit. hum. comp.*, 29, 3, pp. 271–288; 4, pp. 460–498, 35 figs., 1954.

These papers, primarily of medical interest, include an annotated list of 86 Norwegian yeast strains [*R.A.M.*, 31, pp. 354, 567], comprising 35 species, nine of them new, and seven new varieties, and 23 mould strains belonging to two species. The methods of isolation and purification, culture preservation, examination, and fermentation employed are described.

The second paper is devoted to descriptions of the new species and varieties, and the diseases from which the species dealt with originated.

Fennell (Dorothy I.) & Raper (K. B.). **New species and varieties of Aspergillus.** *Mycologia*, 47, 1, pp. 68–89, 8 figs., 1955.

In this paper, which in some measure may be considered as a supplement to the Manual of the Aspergilli by Thom and Raper [*R.A.M.*, 25, p. 141], full descriptions

are given of five new species and five new varieties of *Aspergillus*. The description of *A. unguis* is emended to include a strain which occasionally produces perithecia and ascospores resembling those of *A. nidulans*.

Winitzky (Juana). **Las especies de 'Aspergillus' en muestras de tierra y aire del 'Parque Mesopotámico' y de la 'Selva Misionera'.** [Species of '*Aspergillus*' in soil and air samples from the 'Parque Mesopotámico' and the 'Selva Misionera'.]—*Rev. Invest. agríc., B. Aires*, 7, 4, pp. 341–354, 2 maps, 1953. [Received 1955.]

Soil and air samples from 18 locations in the phytogeographical zones of Argentina known as 'Parque Mesopotámico' and 'Selva Misionera' yielded 287 strains of *Aspergillus* [cf. *R.A.M.*, 24, p. 205] belonging to 13 groups, and 31 different species, of which *A. niger*, *A. terreus*, *A. flavus-oryzae*, and *A. fumigatus* were the most common.

Viennot-Bourgin (G.). **Notes mycologiques (Série IV).** [Mycological notes (Series IV).]—*Rev. Path. vég.*, 33, 1, pp. 31–45, 1 pl., 1954.

In the present contribution to the current series [*R.A.M.*, 33, p. 183] the author states that in July, 1954, *Bremia lactucae* was found near Versailles on *Cynara cardunculus*, *Dimorphotheca pluvialis*, *Gaillardia picta*, and *Melichrysum bracteatum*.

Yamamoto (W.). **Studies on the dissemination of sooty moulds by insects.**—*Mem. Hyogo Univ. Agric.* (Phytopath. Ser. No. 1), 1, 2, pp. 1–50, 1951. [Japanese, with English summary. Received 1955.]

Experimental results and extensive field observations in Formosa have shown that insects such as ants, flies, wasps, bees, and ladybirds disseminate spores and hyphal fragments of sooty moulds. Many of these insects have no relation to those that secrete honeydew. Portions of the fungi which had passed through the digestive systems of the insects were shown to be still viable and flying insects spread the fungi more widely than ants.

Rayss (Tscharna). **Nouvelle contribution à l'étude de la mycoflore de Palestine (sixième partie).** [New contribution to the study of the fungus flora of Palestine (sixth part).]—*Palest. J. Bot.*, J. Ser., 6, 1, pp. 37–46, 1953. [Hebrew summary.]

The present instalment of this work [*R.A.M.*, 30, p. 546 and cf. 33, p. 564] gives 35 species, 22 of which are listed in this series for the first time. The records include *Sphaerulina serograpta* var. *calliprinos* n.var., causing premature leaf fall of *Quercus calliprinos*, *Taphrina coerulescens* [cf. 34, p. 115] on leaves of *Q. infectoria*, *Erysiphe graminis* on *Hordeum bulbosum*, *E. pisi* [*E. polygoni*] on broad bean, *Leveillula taurica* [31, p. 361] on *Glycyrrhiza glabra*, *Impatiens balsamina*, and *Lactuca scariola*, *Phyllactinia suffulta* var. *moricola* on white mulberry, *Oidium verbenae* on *Verbena officinalis*, *Dothidella* [*Cymodothea*] *trifolii* on *Trifolium lappaceum*, *Guignardia cooperta* on *Q. calliprinos*, *Mycosphaerella cinxia* on *Lilium candidum*, and *Sphaerulina maroccana* (associated with *Ascochyta trifolii*) on *Trifolium alexandrinum*.

Mycological branch.—*Rep. Tocklai Exp. Sta., 1953*, pp. 106–123, 1954.

In this report [cf. *R.A.M.*, 33, p. 639] it is stated that severe sun scorch [27, p. 259] affected most of the Indian plains-grown tea in June and again in August, more damage occurring on irregularly shaded than on adequately shaded or unshaded bushes. On badly drained soils *Albizzia odoratissima* shade trees were badly attacked by violet root rot, *Sphaerostilbe repens*.

In Assam 46 outbreaks of blister blight [*Exobasidium vexans*: 33, p. 639] were reported during 1953, of which 30 were in April, due to unusually cold, wet weather.

Better control of black rot [*Corticium invisum*: loc. cit.] was obtained by spraying in April–May than in January–February. Plots sprayed with perenox (old stock), supercuprenox, cuprox, dithane, cuprokylt, cupromox, cupravit, S.R.406 [captan], fungex, and yellow cuprocide developed the following respective incidences of the disease during July–October: 100, 171, 50, 36, 51, 61, 63, 72, 93, and 58, compared with 151 on the untreated.

At the Sycotta Tea Estate an oil-soluble mercury fungicide (1 pint in 100 gals.), capsine (5 per cent.), and tar oil with perenox (5 per cent.: 0·25 per cent.) were applied immediately after pruning in an attempt to control red rust [*Cephaleuros mycoidea*: loc. cit.]. The only treatment giving an appreciable reduction in infection (47 per cent.) was the tar oil and perenox.

Abe (T.) & Kono (M.). **Studies on the white root-rot of Tea bush. I.**—*Sci. Rep. Fac. Agric. Saikyo Univ.* 5, pp. 93–105, 2 pl., 1953.

White root rot, due to one or more *Rosellinia* species, causes considerable damage to many forest trees and cultivated plants, including tea, in Japan; on the latter *R. necatrix* has been recognized. In a study of this disease at the Phytopathological Laboratory, Saikyo University, Kyoto, three strains of *Rosellinia*, two from tea and one from ramie [*Boehmeria nivea*] were isolated and studied in relation to growth and pH conditions. The fungus in the soil was found to inhibit the germination of soy-bean seedlings considerably and to be pathogenic to tea seedlings, particularly in midsummer, less in early summer, and least in winter.

Schramm (G.), Braunitzer (G.), & Schneider (J. W.). **Terminal groups of Tobacco mosaic virus.**—*Nature, Lond.*, 176, 4479, pp. 456–457, 1 fig., 1955.

The authors discuss, with the aid of the literature (17 titles), current knowledge of the structure and number of the peptide chains forming the protein of tobacco mosaic virus [*R.A.M.*, 34, p. 489], obtained from determinations of the carboxylic and amino terminal groups.

At the Max Planck Institute for Virus Research, Tübingen, the determination of the end-groups by four different methods confirmed previous findings and showed the virus protein to be composed of nearly 2,500 peptide chains with identical terminal groups. The basic unit of the protein had a molecular weight of 15,000 to 17,000 and contained 130 to 150 amino acids.

Van Slogteren (D. H. M.). **Gel diffusion of Tobacco mosaic virus, demonstrated by serological analysis of its components and by electron-microscopy.**—*Acta bot. neerl.*, 4, 3, pp. 472–476, 2 pl., 1955.

The experiments herein reported from the Bulb Investigation Laboratory, Lisse, Holland, involved the use of Ouchterlony's gel diffusion method (*Lancet*, 256, pp. 346–348, 1949) and Björklund's agar (*Proc. Soc. exp. Biol., N.Y.*, 79, pp. 319–328, 1952). The precipitation pattern of samples of expressed sap from White Burley tobacco plants infected by tobacco mosaic virus, as revealed by electron micrographs, consisted of double lines, which are interpreted as representing two components with particles of different size and shape [cf. *R.A.M.*, 32, p. 593; 34, p. 617, *et passim*]. No such patterns appeared in comparable samples from virus-free plants. The majority of the rod-shaped particles of tobacco mosaic virus measured approximately 250 mμ in length.

Wills (W. H.). **The utilization of carbon and nitrogen compounds by Phytophthora parasitica Dastur var. nicotianae (Breda de Haan) Tucker.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 231–235, 1954.

In studies at the Department of Botany, Duke University, Durham, North Carolina, *Phytophthora parasitica* var. *nicotianae* from tobacco [*R.A.M.*, 34, p. 404

and following abstracts] grew best in media containing sodium nitrate as the nitrogen source when dextrin and starch were used as the carbon sources. None of the organic acids tested was utilized by the fungus and only glycerol of the alcohols, the other alcohols inhibiting growth. Asparagine was the most rapidly assimilated amino acid, but these compounds were utilized poorly. The best nitrogen sources in a sucrose medium were ornithine, histidine, threonine, serine, proline, arginine, and glutamic acid.

A synthetic medium containing soluble starch and glutamic acid was selected on the basis of the above results for studies with the fungus.

Wills (W. H.). **Sporangium formation by Phytophthora parasitica Dastur var. nicotianae (Breda de Haan) Tucker.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 235–243, 1 diag., 1954.

In further work on the tobacco black shank fungus (*Phytophthora parasitica* var. *nicotianae*) [see preceding abstract] the formation of sporangia was obtained by incubating the mycelium in a soil extract with a maximum temperature between 20° and 25° C. and a pH range from 5·4 to 11 without a clear optimum. A tenfold concentration of tap water induced abundant sporulation, while a hundredfold one was inhibitory to it. Abundant sporulation was also obtained in a salt solution consisting of 50 mg. potassium chloride, 100 mg. potassium phosphate, 50 mg. magnesium sulphate, and 300 mg. potassium carbonate in 1,000 ml. distilled water. The induction of sporulation is due to the proper balance and concentration of inorganic ions in the medium, the anion complex being more important in this respect than the cation, the most important determiner being the carbonate. The effect of pH is inseparable from that of components in the medium, both probably interacting to produce conditions suitable for the change from vegetative growth to sporangium formation.

The fungus is thought to be primarily a soil organism and secondarily a pathogen. Variations, arising possibly from crosses with other strains and other species, may explain the breakdown in resistance in plants bred for resistance when considered along with other factors responsible for this breakdown.

Wolf (F. T.) & Wolf (F. A.). **Toxicity as a factor in Tobacco black shank.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 244–255, 1954.

Studies on toxin production by *Phytophthora parasitica* var. *nicotianae* [see preceding and following abstracts], as judged by the amount of wilting induced in detached tomato and tobacco leaves, showed that filtrates of cultures grown in diluted tobacco sap for two weeks or more or in potato dextrose broth or a starch-glutamic acid synthetic medium for four weeks or more regularly induced wilting, which occurred in dilutions of 1:1, 1:5, or 1:10. Toxin was demonstrated in infected plants by adsorbing it on charcoal and by transferring test leaves to distilled water following short periods of contact with the products of ground diseased tissues. It was also demonstrated in the fluids removed by suction from the stems of diseased plants. The toxin produced in culture filtrates of the pathogen is moderately heat stable, non-volatile, and dialyzable. Efforts to elute it from the charcoal have been unsuccessful.

Schramm (R. J.) & Wolf (F. T.). **The transpiration of black shank-infected Tobacco.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 255–261, 1 fig., 2 graphs, 1954.

Tobacco plants infected with *Phytophthora parasitica* var. *nicotianae* [see preceding and following abstracts] transpire at a slower rate than healthy ones and the water loss decreases as the disease progresses. This is due to the progressive destruction of the roots, occlusion of the vessels, and toxin production.

Wolf (F. T.) & Schramm (R. J.). **Respiration of Tobacco black shank tissues.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 261–264, 1954.

Respiratory rates of tobacco tissues affected by black shank (*Phytophthora parasitica* var. *nicotianae*) [see preceding and next abstracts] are reported to be appreciably higher than those for healthy pith tissues. The rate of respiration apparently changes during the course of the disease, being maximal early in the cycle.

Wolf (F. A.) & Wolf (F. T.). **The carbohydrate and nitrogen metabolism of black shank-affected Tobacco.**—*J. Elisha Mitchell sci. Soc.*, 70, 2, pp. 264–269, 2 graphs, 1954.

Comparative chemical analyses of mature tobacco leaves affected by black shank (*Phytophthora parasitica* var. *nicotianae*) [see preceding abstracts] and of normal leaves both in the field and in the greenhouse showed that a profound modification in carbohydrate and protein synthesis follows infection. Leaves from affected plants contain less total and reducing sugars, and a larger proportion of the total nitrogen content is soluble. The mechanism of such modifications or the proximate cause is tentatively attributed to reactions involving toxins.

Kelman (A.). **A differential medium for the detection of mutants of the Granville wilt bacterium.**—Abs. in *J. Elisha Mitchell sci. Soc.*, 70, 2, p. 127, 1954.

The type of mutant colony most frequently encountered in cultures of *Pseudomonas solanacearum* [*R.A.M.*, 33, p. 744], causing Granville wilt of tobacco, is uniformly round, non-fluidal or butyrous, and transparent. Streaking dilute bacterial suspensions on a glucose-peptone-casein hydrolysate medium containing 0·005 per cent. triphenyl tetrazolium chloride greatly facilitates detection of mutant colonies. The wild type ones become either entirely white or white with a small, light red centre 36 hours after growth at 32° C. The mutants form dark red colonies with a narrow, white border and are less pathogenic than the wild type.

Alexander (L. J.). **Ohio W-R Brookston.**—*Fm Home Res.*, 39, 286, p. 8, 1 fig., 1954.

A new tomato variety, Ohio W-R Brookston, resistant to wilt [*Fusarium bulbigenum* var. *lycopersici*] and selected for its tolerance of tobacco mosaic virus [*R.A.M.*, 32, p. 518] and *Alternaria* leaf spot [*A. solani*], has been developed at the Ohio Agricultural Experiment Station.

Miller (P. R.) & O'Brien (Muriel J.). **Tomato late blight : its world distribution and present status.**—*Plant Dis. Reptr, Suppl.* 231, 89 pp., 51 maps, 1955. [Multilithed.]

This survey of the world distribution of tomato blight (*Phytophthora infestans*) [C.M.I. map No. 109] gives for each country, arranged in continents, the first known record, a distribution map accompanied by notes on occurrence and spread, damage, control measures and their effectiveness, and strains and varietal resistance, with a continental bibliography. There are some new records for the mid-western and north-central States of America and for Africa. An appendix gives the common names of the disease in the various countries.

Sakimura (K.). **Frankliniella tritici, a non-vector of the spotted wilt virus.**—*J. econ. Ent.*, 46, 5, 915–916, 1953.

Transmission tests conducted at the Rockefeller Institute, Princeton, New Jersey, during 1948 confirmed that *Frankliniella tritici* is not a vector of [tomato] spotted wilt virus; tests with *F. tenuicornis* were inconclusive.

Schaefer (E. E.) & Loest (F. C.). **Spotted wilt or kromnek of Tomatoes.**—*Fmg in S. Afr.*, 30, 346, pp. 23, 36, 2 figs., 1955.

The authors recapitulate the symptoms, distribution, host range, dissemination, and control of the tomato spotted wilt [virus] in South Africa [*R.A.M.*, 28, p. 23]. It is particularly prevalent from Rustenburg to Johannesburg, from Pretoria to Bronkhorstspruit, in the north-eastern Transvaal, the western and eastern Cape, and in Bloemfontein and its immediate vicinity. The control measures recommended are as follows. Seed should be sown where the plants are to remain or, if transplanting takes place, growth should be set back as little as possible and the plants set as closely as possible to increase the likelihood of escape from outside infection. Infected plants should not be pulled out. Fields should be isolated from other crops harbouring the virus or vector and weeds kept down or dusted with $2\frac{1}{2}$ or 5 per cent. DDT [loc. cit.]. Seed-beds should be dusted at weekly intervals up to flowering with 1 per cent. parathion dust and thereafter with $2\frac{1}{2}$ per cent. DDT dust every three weeks.

Kimura (K.). **On the sex of some wood-destroying fungi. II.** *-Bot. Mag., Tokyo*, 67, 787–788, pp. 34–35, 1954. [Japanese, with English summary.]

A further communication on the sex of wood-destroying fungi [cf. *R.A.M.*, 33, p. 648] notes that the pairing of monosporous mycelia of *Lenzites betulina*, *Stereum* [*Hydnum*] *ochraceum*, *Claudopus nidulans*, and *Coriolus* [*Polystictus*] *hirsutus* proved these fungi to be tetrapolar and heterothallic.

Turel (Franziska L. M.). **Influence of methyl p-hydroxybenzoate, chlortetracycline, and certain trace metals on germination of uredospores of Melampsora occidentalis Jacks.**—*Canad. J. Microbiol.*, 1, 5, pp. 293–298, 5 graphs, 1955.

In studies on plant rusts at the Prairie Regional Laboratory, Saskatoon, Saskatchewan, the addition of 80 p.p.m. methyl-*p*-hydroxybenzoate stimulated the germination of uredospores of *Melampsora occidentalis* from poplar to 31 per cent. compared with less than 1 per cent. in distilled water. The maximum stimulation (60 per cent.) was achieved by a mixture of methyl-*p*-hydroxybenzoate, nickel sulphate (1·2 p.p.m. nickel), and 25 p.p.m. aureomycin, though the last two had no effect when added singly. No comparable effect was observed with other rust species.

Kerling (L[uise] C. P.). **Reactions of Elm wood to attacks of Ophiostoma ulmi (Buism.) Nannf.**—*Acta bot. neerl.*, 4, 3, pp. 398–403, 1 graph, 1955.

At the Phytopathological Laboratory 'Willie Commelin Scholten', Baarn, Holland, the author studied the reactions of the xylem of the elm hybrids No. 214 (*Ulmus pinnato-ramosa* × *U. hollandica hoersholmensis*) and No. 263 (*U. glabra* No. 49 × *U. carpinifolia* No. 28) to inoculation with *Ophiostoma* [*Ceratostomella*] *ulmi* [*R.A.M.*, 34, p. 1]. Four days after injection the pathogen could be isolated from a point at a distance of 75 cm. [cf. 20, p. 608]. Slightly beyond this limit, discoloration of the vessel walls and formation of gum droplets in the pit cavities were observed, followed by the development of tyloses. The expanding living cells invariably penetrated those pits in which gummosis was absent. Gummosis tends to be associated with the adhesion of numerous spores to the walls of the vessels, while tyloses are more likely to occur in sites where the toxin responsible for both types of reaction is less concentrated.

Schönhar (S.). **Erfahrungsberichte aus der Württembergischen Forstlichen Versuchsanstalt. 1. Keimlingsfäule und Wurzelfäule im Pflanzgarten.** [Reports on observations made at the Forestry Experimental Station of Württemberg.

1. Seedling rot and root rot in the nursery.] -*Allg. Forstz.*, 10, 13, pp. 165–166, 1955.

During the past two years there have been severe losses in forest nurseries in south-west Germany from seedling and root rot. Conifers, particularly Douglas fir [*Pseudotsuga taxifolia*] and Wellingtonia [*Sequoia* sp.], suffered most; beech was susceptible, oak resistant. Concerned in both types of rot were species of *Phytophthora*, *Pythium*, *Botrytis*, *Rhizoctonia*, and *Fusarium*, and *Rhizina undulata* [*R. inflata*].

The symptoms of seedling rot are dark, rapidly increasing spots on root, shoot, and cotyledons; progressively the whole plant is infected, shrinks, and dies; the shoot may bend and the top touch the soil. Rot may often appear at germination when the root shrinks and dies. If rot affects the top only, after the first leaves have unfurled, the seedling may recover. Seedling rot usually starts in humid weather during the growing period. Root rot enters through the fine root ends or lesions and destroys the roots of young plants, the stem and leaves remaining green and dying slowly. Recovery may ensue unless the whole root has been infected.

Nurseries should be established on sandy clays or clayey sands, where surface crusting is least likely. Heavy soils are best treated with peat or lime. Flooding and crusting, conducive to rot, can be combated by repeated hoeing or by covering the beds with a few mm. of coarse sand or fine slag, or in humid summers a thin layer of peat. The humus content of a nursery must not be allowed to fall below 6 per cent. Humus seems to favour organisms antagonistic to rot fungi, a content of 10 per cent. proving unfavourable to pathogens. A neutral or alkaline reaction increases susceptibility, particularly if the nitrate content is high, and induces chlorosis. The most severely affected beds had a pH of 8. Frost favours rot. It is concluded that the devastating outbreak of seedling and root rot in recent years was due mainly to excessive lime and nitrogen applications and frequent lack of humus.

Rotation and green manuring every three to five years are recommended. In humid weather shading devices should be removed. Eradication and burning of diseased plants does not prevent, but slows down, the spread of rot. Fungicidal control is laborious and alleviates only seedling rot and only in favourable conditions, not in crusted and flooded alkaline soil poor in humus. Disinfection of severely infected, temporarily vacant beds with formalin and similar products is successful for a time, but soil conditions must be improved as well or rot reappears a few years later and is even worse.

West-Nielsen (G.) & Oksbjerg (E.). **Om rodfordærverangreb. II. Fortsatte undersøgelser over Granens vækst og sundhed.** [On root-destroyer attack. II. Further investigations into the growth and health of Spruce.]—*Hedeselsk. Tidsskr., Aarhus*, 75, 14, pp. 336–343, 3 figs., 1 diag.; 15, pp. 347–351, 1 diag., 1954.

Further observations on spruce plantations in relation to attacks by *Trametes* [*Fomes*] *annosus* [cf. *R.A.M.*, 34, p. 194] were made on areas planted in 1905, at Sevel, Denmark, where fertilizer treatments on cover plants were investigated. Attacks were severe in heavily limed plots (2,000 kg. yearly), moderate in others. In a neighbouring stand planted in 1906 *Fomes* attacks on limed plots were heavier in trenched than in subsoiled parts; there was no difference on marled plots.

Kimmey (J. W.). **Determining the age of blister rust infection on Sugar Pine.**—*For. Res. Notes Calif.* 91, 3 pp., 1954. [Mimeographed. Received September, 1955.]

In order to check that Lachmund's method for determining the age of blister rust [*Cronartium ribicola*] infection in western white pine [*Pinus monticola*: *R.A.M.*, 12, p. 603] is still applicable to sugar-pine [*P. lambertiana*] in southern Oregon and

northern California, the canker distribution from infection of known age was analysed from data on four plots in Oregon and two in California designed primarily for studying rust spread. The tallies for all the Oregon plots were approximately the same as for *P. monticola* and although the percentage of cankers originating in the interwhorls of the year of infection in *P. lambertiana* was approximately twice that for *P. monticola* in the California plots the general patterns were similar and left no doubt as to the year of infection when Lachmund's method was applied.

Lyubarsky (L. V.). Лесохозяйственное значение наплывов на ветвях Сосны обыкновенной. [The importance in forestry of cankers on the branches of the common Pine.]—*Les. Khoz.*, 5, 2, pp. 78–79, 1952.

The trunks and branches of the common pine (*Pinus sylvestris*) in natural stands in the forests of the far eastern part of the U.S.S.R. in Amur Province, west of the River Zeya, often bear resinous cankers caused by *Cronartium quercus* [*C. quercuum*: *R.A.M.*, 33, p. 261], the alternate host of which is *Quercus mongolica*. Canker decreases as the western boundary of the natural range of the oak is approached. Other biological and climatic conditions must also be involved since in other regions where oak carrying *C. quercuum* grows with pine the latter is not infected. Nor have cankers been observed on *P. funebris* growing with oak in the southern maritime province. Cankering of the common pine increases with decrease in site quality, a fact which is probably explained by the scarcity or absence of *Q. mongolica* in the underwood on higher quality sites. Relatively few cankers do not materially affect the growth of the pines but many render them more liable to attack by other organisms and to eventual death. Trees bore up to 150 cankers; the old ones were up to 70 cm. in diameter, their weight breaking the branches. Once fallen they dry out without decaying and are collected for resin extraction. In Amur Province about 80 per cent. of the resin produced is derived from this source.

Kalandra (A.). **Sypavka borová — lophodermiosa borovice lesní — a boj proti ní.** [Pine needle cast—lophodermiosis of forest Scots Pine—and its control.]—*Lesn. Knihovna* (*malá Řada*) 44, 49 pp., 1 col. pl., 8 figs., 2 maps, 1954. Kčs. 3.45.

The author discusses the various *Pinus* hosts of the needle cast fungus (*Lophodermium pinastri*) [*R.A.M.*, 30, p. 130], its morphology, biology, and distribution in Czechoslovakia, the different stages of attack, the damage incurred, and the recovery of affected trees. Trials are advocated to discover possible resistant strains of *P. sylvestris* [32, p. 49]. Methods of preventing the introduction of the disease into healthy areas and its spread in those already affected are described. Recommended control measures [32, p. 526] include treatment with Bordeaux mixture and the use of suitable fertilizers and of older, taller planting stock.

Davidson (R. W.). **Wood-staining fungi associated with bark beetles in Engelmann Spruce in Colorado.**—*Mycologia*, 47, 1, pp. 58–67, 3 figs., 1955.

In work at the Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, four species of the Ophiostomataceae were found to be associated with the bark beetle *Dendroctonus engelmanni* in bark of dying Engelmann spruce (*Picea engelmannii*). Of these, the most prominent and most consistently associated with the beetle was *Leptographium engelmannii* n.sp., which causes a light grey stain in the sapwood, found in every tree examined and known to have been killed by the insect. The stain may be present in streaks or in small or large patches, but it occurs only in those parts of the trunk where the insects have invaded the bark, spreading from the entrance galleries. The same fungus causes a dark grey stain in the sapwood of *Pinus contorta* attacked by the same beetle. It was isolated from the

beetles and also from sapwood of spruce and pine five to six years after the trees had been killed by the beetles. The conidiophores, which form a dense grey growth, measured 40 to 250 by 3 to 7 μ; the conidia formed on penicillate branches measured 2 to 5 by 1·5 to 2 μ, and if formed directly on the hyphae 4 to 5·5 by 2 to 3·5 μ. No perithecia were observed.

Ophiostoma truncicola n.sp. was found in the main galleries of the beetles. The black, smooth perithecia had a spherical or almost spherical base, measured 225 to 300 μ in diameter, had black, crooked, curved, or straight necks 400 to 1,200 μ long, 50 to 75 μ thick at the base, and 30 to 50 μ thick at the tip, with no bristles round the ostiole. The ascospores, kidney- or half-moon-shaped, measured 3 to 4·2 by 2 to 2·6 μ. The hyaline, one-celled conidia, broader at one end than at the other, measured 4 to 7 by 2·2 to 3·2 μ and were borne on hyaline hyphae or in wet, white masses on synnemata 20 to 75 μ high by 10 to 35 μ wide.

Endoconidiophora [*Ceratocystis*] *coerulescens* was occasionally present in the galleries and was also found on the sapwood of logs cut from beetle-infested trees.

O. bicolor n.sp. was isolated once from an adult *D. engelmanni* beetle, but was also obtained from other sources in Canada. The light pink to light brown, spherical perithecia measured 240 to 360 μ in diameter; the dark brown to black necks were 500 to 1,200 μ or more long, 50 to 70 μ thick at the base and 18 to 40 μ at the tip, with no bristles round the ostiole; the box-shaped ascospores were hyaline, yellow in the mass, and measured 3·5 to 6 by 2·5 to 4 μ. The ovoid to cylindrical, hyaline, thick-walled conidia measured 5 to 12 by 3 to 5 μ.

Methods of applying wood preservatives.—*Rep. For. Prod. Lab., Madison*, D 154 (revised ed.), 28 pp., 1953. [Mimeographed.]

This report deals shortly with the preparation of timber for treatment, the various methods of applying preservatives, the inspection of treated timber, and the effect of treatment on strength. Nineteen references to further sources of information are listed.

Baechler (R. H.). **How to treat fence posts by double diffusion.** –*Rep. For. Prod. Lab., Madison*, U.S. Dep. Agric. 1955, 4 pp., 4 figs., 1953.

This is a popular account of the recommended procedure for the treatment of pine fence posts [*R.A.M.*, 33, p. 61] by a double diffusion process. Freshly peeled green posts are stood butt end downwards in a solution of copper sulphate (18 lb. in 24 gals.) for two days, and then transferred to a solution of anhydrous sodium chromate (18 lb. in 26 gals.) for a like period, the posts being turned upside down after the first day. The two chemicals combine inside the wood to form a toxic compound which is almost insoluble in water and thus not readily leached from the posts by rain.

Orman (H. R.). **The relative efficacy of certain chemical dip treatments in preventing sapstain in Pinus radiata.** –*Aust. Timb. J.*, 20, 11, pp. 831–832, 835, 901, 903, 905, 1954.

At the Forest Research Institute of New Zealand the relative efficiency of nine chemical dip treatments for the prevention of sap or blue stain, caused by [unspecified] fungi, was investigated in test stacks of freshly sawn *Pinus radiata* boards throughout the year 1951–2.

Most of the compounds conferred quasi-complete protection during the first month; thereafter the best results were obtained with the following solutions: 0·4 per cent. sodium pentachlorophenate plus 1·2 per cent. borax plus 0·1 per cent. ethyl mercuric chloride; 0·4 per cent. sodium pentachlorophenate plus 0·3 per cent. sodium trichlorophenate; 0·4 per cent. sodium pentachlorophenate plus 1·2 per cent. borax; and 0·6 per cent. sodium pentachlorophenate. Staining tends to be

most severe during the warmer months and may be reduced to a minimum by erecting the stacks immediately before or during the cold season.

Spikes (J. D.) & Stout (M.). **Photochemical activity of chloroplasts isolated from Sugar Beet infected with virus yellows.**—*Science*, 122, 3165, pp. 375–376, 1 graph, 1955.

Preliminary experiments at the University of Utah and the Field Crops Research Branch, Salt Lake City, indicated that beet yellows virus decreased photosynthesis and sugar production in sugar beets by direct action on the chloroplasts rather than by some indirect effect on the photosynthetic mechanism or by interference with the translocation of carbohydrate in the phloem [cf. *R.A.M.*, 33, p. 130]. The degree of yellowing of the affected leaves [33, p. 460] is not necessarily related to the severity of chloroplast injury.

Steudel (W.) & Heiling (A.). **Vergleichende Untersuchungen zur Frage der Wirkung von Systox und Metasystox bei der Bekämpfung der Vergilbungskrankheit (Beta-Virus 4).** [Comparative investigations on the question of the action of systox and metasystox in the control of the yellows disease (*Beta* virus 4).]—*Zucker*, 8, 10, pp. 207–212, 4 graphs, 1955.

In continuation of the experiments already reported on the control of beet yellows virus in western Germany by means of spraying with systox to exterminate the aphid vectors, *Myzodes* [*Myzus*] *persicae* and *Doralis* [*Aphis*] *fabae* [*R.A.M.*, 32, p. 529], further trials were carried out in 1953–4 in the Rhineland and Westphalia with the same preparation at a rate of 400 ml., and metasystox at 400 and 800 ml. per ha., with a total spray consumption of 400 l. per ha. Used at the lower concentration metasystox failed to confer adequate protection, but at the higher one it was equal or slightly superior to systox at 400 ml. In greenhouse tests metasystox was less effective than systox, whereas in the field the former at 800 ml. and the latter at 400 ml. gave comparable results in the reduction of aphid transmission. In 1954 the average increases in root and sugar yields secured by two applications of metasystox at 800 ml. and systox at 400 ml. were approximately 9 and 11 per cent., respectively.

Johnson (H. G.). **Investigations on the control of root rot of canning Peas.**—*Diss. Abstr.*, 14, 8, p. 1124, 1954. [Received September, 1955.]

At the University of Minnesota a disease index was evaluated for determining the degree of root rot of canning peas caused by *Aphanomyces euteiches* [*R.A.M.*, 30, p. 299] and of soil infestation, which was heaviest in fields where peas were grown intensively. Healthy plants were rated 10 and those killed by *A. euteiches* at 100; on this basis fields with an index greater than 40 were unsuitable for this crop, while from 10 to 30 was quite safe. Greenhouse tests for the degree of infestation of field soils usually gave a good indication of the amount of root rot expected in the ensuing season. The severity of root rot developing in plants grown in mixtures of field soil samples was similar to that in the most heavily infected samples. Root rot incidence was reduced by the use of tile drainage, nitrogen fertilizers, well-rotted organic fertilizer, and rye green manure.

In inoculation experiments the amount of root rot was proportional to the inoculum used in the form of infested soil. Preliminary experiments indicated that good control of *A. euteiches* was given by the soil fumigant OS-1199. The tolerance of *A. euteiches* root rot exhibited by some foreign pea varieties is attributed to their ability to produce new roots.

Fungicides protect plants from smog in field tests.—*Calif. Citrogr.*, 40, 3, p. 105, 1955.

In experiments made at the University of California Citrus Experiment Station by J. B. Kendrick, bean [*Phaseolus vulgaris*] plants dusted with zineb or thiram

suffered little or no damage during 'smog' [*R.A.M.*, 30, p. 207], while unprotected plants in the same plot were injured. Other dithiocarbamate compounds gave similar protection to a lesser degree. Dusting was more effective than spraying, because it protected the lower leaf surfaces also. Investigations on this line are being continued, as well as on the most economical dosage and the period of protection.

Sheneider (Y. I.). Новый эффективный препарат для борьбы с бактериозом Фасоли. [New effective preparation for the control of Bean bacteriosis.]—Сад и Огород [*Orchard & Garden*], *1955*, 2, p. 39, 1955.

Some of this information on the control of bacteriosis [halo blight: *Pseudomonas medicaginis* f. sp. *phaseolicola*] of beans [*Phaseolus vulgaris*] in the U.S.S.R. has already been noticed from another source [*R.A.M.*, 34, p. 16]. In experiments with thiram dust (3 to 5 gm. per kg. seed) in 1954 the number of diseased shoots was reduced by 36 to 40 per cent. and infected leaves by 12 to 27 per cent. The field quality of the plants was improved and yields increased by an average of 2 to 3 z[entner = 50 kg] per ha. The above concentrations are recommended for testing under commercial conditions.

Labaw (L. W.) & Wyckoff (R. W. G.). **Molecular arrangement in crystals of the southern Bean mosaic virus protein.**—*Nature, Lond.*, 176, 4479, p. 455, 2 figs., 1955.

Since the discovery that evaporated films of carbon permit a very significant advance in both the quality of replication and the kinds of macromolecular virus crystals that can be successfully studied by the electron microscope, researches at the National Institute of Arthritis and Metabolic Diseases and the National Institutes of Health, Bethesda, Maryland, have demonstrated the numerous crystal faces that are revealed when carbon films are used to prepare specimens of southern bean mosaic virus [from *Phaseolus vulgaris*: *R.A.M.*, 33, p. 368]. The improvement is attributed partly to the advantageous mechanical and electron optical properties of the films and partly to their chemical inertness and the possibilities of various purifying procedures that this offers. The crystal symmetry was almost cubic and the principal face invariably that of a dodecahedron. The molecular arrangement was a cubic close packing of essentially spherical molecular particules about 230 Å in diameter. The unit cube containing four molecules measured about 325 Å along the edge.

Mushroom growing.—*Bull. Minist. Agric., Lond.*, 34, 79 pp., 22 pl., 2 figs., 1954. 5*s*. [Received May, 1955.]

In the sixth edition of this bulletin [*R.A.M.*, 30, p. 213], revised by H. H. Glasscock, the results of recent research are included, particularly from the Yaxley Research Station, Peterborough. Appendices deal with substitutes for horse manure, the tray system, outdoor culture in pastures, the nutritive value of the mushroom, and the composition and manurial value of spent compost.

Kundert (J.). **Die Peronospora der Rebe und deren Bekämpfung im Jahre 1954.** [The *Peronospora* of Vine and its control in the year 1954.]—*Schweiz. Z. Obst- u. Weinb.*, 64, 6, pp. 101–107, 2 figs., 2 graphs, 1955.

Though the incidence of vine downy mildew (*Peronospora*) [*Plasmopara viticola*] is largely dependent on weather conditions, the peculiar climate of Switzerland makes reliable forecasts impossible. In 1954 only isolated infections occurred in the Zürich district, and the Wädenswil Experiment Station reduced the usual seven sprayings to five [cf. *R.A.M.*, 33, p. 579]. Rainfall in the significant period

from May to July was 441 mm., i.e., normal, and the only continuous period of dry weather was between 18th and 29th July.

The low incidence of mildew is ascribed to low temperature, the May average being 2·8° C. below that in 1953, and to late development of the vine. Commercial spraying was stopped well before real mildew danger threatened in August and September. In consequence plants treated with organic compounds of little persistence showed late leaf infections.

On 26th October, when all untreated leaves had fallen, zineb, which inhibited late mildew infections without damaging the vines, had left an average of 55 leaves per vine; when combined with copper, 39. Products with copper only left between 21 and 46 leaves, according to the severity of the burns, Bordeaux mixture 29, and captan 27 leaves. With captan, captan-sulphur, and particularly with the organo-copper products the leaf shedding was obviously caused by the severe late mildew infections, whereas with captan-copper it was due to the copper. After 27th July (the seventh spray) vines sprayed with organic products with copper added bore no mildew but were practically leafless at the time of counting; hence a final spray with Bordeaux mixture is recommended after the organic treatments to combat both *Botrytis* [*cinerea*: see following abstracts] and possible late mildew infections.

Stalder (L.). **Botrytis-Schäden an Rebholz.** [*Botrytis* damage on Vine wood.]—*Schweiz. Z. Obst- u. Weinb.*, 64, 3, pp. 45–49, 4 figs., 1955.

After continuous rainfall in the summer of 1954 heavy incidence of *Botrytis cinerea* [cf. preceding and next abstracts] occurred in vineyards round Lake Zürich. It is thought that the disease may have been favoured by the cold, wet summer, which delayed the hardening of the wood, by the occurrence of *Botrytis* rot in the stalks, whence the fungus may have invaded the shoots before the stalks were removed, and by the mildness of November and December, allowing the hyphae to continue growing inside the wood.

Schellenberg (A.). **Kulturmaßnahmen zur Verminderung der Traubenfäulnis.** [Cultural measures for the reduction of Vine grey mould.]—*Schweiz. Z. Obst- u. Weinb.*, 64, 6, pp. 107–112, 1955.

The recurrent damage from *Botrytis cinerea* [cf. *R.A.M.*, 33, p. 521 and preceding abstracts] to the vineyards of eastern Switzerland in 1954 amounted to about 20 per cent. of the total crop. In addition, the enforced premature picking to avoid excessive losses will lead to the production of inferior wines, and the necessary sorting of the grapes caused additional expense.

As the development of the fungus is encouraged by plant features resulting from excess nitrogen applications, care is recommended in fertilizing. Another important factor is how dry the vine can be kept and how quickly it can dry when wet. There should therefore be leaves above the grapes, but not too many around them, the stems of the vines should be high (40 to 50 cm.) and their bases free from weeds. Notes on height and spacing are given, and on pole- and wire-training.

Harvey (J. M.). **A method of forecasting decay in California storage Grapes.**—*Phytopathology*, 45, 4, pp. 229–232, 3 graphs, 1955.

Fumigation of California table grapes with sulphur dioxide reduces but does not eliminate the incidence of decay in storage caused mainly by *Cladosporium herbarum* and species of *Alternaria* and *Stemphylium* in the early part of the harvest season and by *Botrytis cinerea* at a later date, following periods of high humidity and rainfall [*R.A.M.*, 34, p. 625].

The percentages of incipient infections in Emperor grapes developing after fumigation and incubation at room temperature for 10 days at the United States

Horticultural Field Station, Fresno, California, were found to be closely correlated (average r = 0·95) with those occurring in the same lots after 2½ to four months' storage. The laboratory determination could therefore be used to predict the amount of rotting likely to develop in storage. On this basis grapes with a tendency to decay could be sold early while those likely to remain sound could be safely stored.

Fry (P. R.) & Taylor (W. B.). **Analysis of virus local lesion experiments.**—*Ann. appl. Biol.*, 41, 4, pp. 664–674, 1954.

At the Applied Mathematics Laboratory, Department of Scientific and Industrial Research, Wellington, New Zealand, an analysis was made of the data from various trials to determine the variation of lesion numbers in Black Valentine bean plants (*Phaseolus vulgaris*) infected with tobacco necrosis virus [*R.A.M.*, 33, p. 278], White Burley tobacco infected with turnip mosaic virus, and *Nicotiana glutinosa* infected with tobacco mosaic virus or tomato spotted wilt virus. Calculations based on variation of lesion counts about means within the range 7 to 260 per half-leaf showed that the standard deviation may be made independent of the mean by a transformation log $(x+12)$ for half-leaf experiments with bean, tobacco, and *N. glutinosa* and log $(x+21)$ for whole-leaf experiments with bean. The superiority of the half-leaf over the whole-leaf technique was apparent. Balanced incomplete block designs were more efficient than randomized blocks or comparisons using a common standard. The use of co-variance to remove the effect of leaf susceptibility gave increased accuracy over the treatment-standard comparison when the former method was employed with designs permitting the removal of variation due both to plant and to age.

Steere (R. L.). **Concepts and problems concerning the assay of plant viruses.**—*Phytopathology*, 45, 4, pp. 196–208, 1955.

In this paper, presented at the Symposium on Concepts and Problems in Virology at the 26th Annual Meeting of the American Phytopathological Society at Estes Park, Colorado, on 26th August, 1954, current developments in the assay of plant viruses are summarized and discussed in the light of 128 contributions to the pertinent literature.

Black (L. M.). **Concepts and problems concerning purification of labile insect-transmitted plant viruses.**—*Phytopathology*, 45, 4, pp. 208–216, 4 figs., 1954.

An attempt is made in this contribution (supplemented by a bibliography of 45 titles) to the Symposium on Concepts and Problems in Virology at the 46th Annual Meeting of the American Phytopathological Society at Estes Park, Colorado, on 26th August, 1954, to depict some recent advances in the understanding of the unstable, insect-transmitted plant viruses. Not only are some experimental data presented, but an endeavour is made to evaluate their significance, examine some of the questions raised, and put forward hypotheses for their solution. In this connexion reference is made principally to work on three viruses familiar to the author, i.e. potato yellow dwarf [*R.A.M.*, 30, p. 535], clover wound-tumour [big vein: 33, p. 299], and tomato spotted wilt (abs. in *Phytopathology*, 42, p. 3, 1952).

Stahmann (M. A.) & Kaesberg (P.). **Concepts and problems concerning the electron microscopy of plant viruses.**—*Phytopathology*, 45, 4, pp. 187–195, 3 figs., 1 diag., 1955.

Up-to-date information on the methods and applications of electron microscopy in relation to plant viruses [*R.A.M.*, 34, p. 514], based on a bibliography of 25 titles, is presented in this paper contributed to the Symposium on Concepts and Problems in Virology at the 46th Annual Meeting of the American Phytopathological Society at Estes Park, Colorado, on 26th August, 1954. Many of the studies referred to have been noticed from time to time in this *Review*.

CONTENTS

AUTHORS' NAMES

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